PROPOLAR
REPORT 2018

PROPOLAR
Programa Polar Português

© Gonçalo Vieira

PROPOLAR • REPORT 2018

March 2019

Portuguese Polar Program - PROPOLAR

Instituto de Geografia e Ordenamento do Território (IGOT)
Centro de Estudos Geográficos (CEG)
Rua Branca Edmée Marques
1600-276 Lisboa, PORTUGAL

Phone: +351 210 442 962
E-mail: info@propolar.org
Website: www.propolar.org

Editor: Centro de Estudos Geográficos (CEG)
Authors: Maria Teresa Cabrita, Ana David, Gonçalo Vieira
Design and Layout: Maria Teresa Cabrita
Printing: Idg - IMAGEM DIGITAL GRÁFICA

ISBN: 978-972-636-277-7

© Teresa Cabrita

FOREWORD

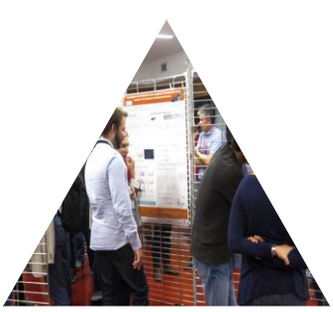
We are pleased to present in this booklet, a report of the main activities conducted between August 2017 and December 2018, within the framework of the Portuguese Polar Program - PROPOLAR. PROPOLAR is led by the CEG/IGOT - University of Lisbon, under a Coordinating Committee that includes members of other 4 Portuguese research institutions: CCMAR - University of the Algarve, MARE - University of Coimbra, CQE - University of Lisbon, and CIIMAR - University of Oporto. The Program is funded by the Fundação para a Ciência e a Tecnologia (MCTES) as a development of its former Polar Office.

Portugal benefits from the unique conditions of the Polar regions to obtain fundamental knowledge for better understanding and managing of climate change and its impacts, as well as to contributing to answer fundamental questions on the functioning of the Earth System. Portuguese polar science has experienced significant developments during the last decade, leading to new results with international impact on scientific areas with considerable gaps in knowledge still needing to be filled. Portuguese researchers have found relevant niche areas, which are now maintained within the framework of the PROPOLAR. The past two years have been pivotal to the consolidation of the program, with increased national recognition of the importance of polar research. In supporting Portugal's national polar research, the Portuguese Government has promoted the implementation of a long-term strategic agenda for the polar sciences, and consolidated the budget of the program, enhancing Portugal's scientific polar abilities and capacity, as well as consolidating the program for the future. Logistics are based on international cooperation and on a Portuguese-funded Antarctic flight open to partner programs. Campaigns to the Arctic and Antarctic occur on an annual basis, with c. 15 projects per year taking place in the polar regions. Logistical support in Antarctica is mainly provided by Spain, Chile and the Republic of Korea, also with strong cooperation in research and use of facilities, with Argentina, Brazil, Bulgaria, China, Peru, Turkey and Uruguay. PROPOLAR is committed to improving the liaison between science and society, through promoting the importance and relevance of our polar science and operational activities by engaging with policy-makers, the general public, the young generations, and the media.

The activities herein disclosed reflect the determination and motivation of the PROPOLAR to challenge itself and take forward this program, with the support and involvement of a very dynamic and committed community of polar researchers, which are the true identity of the Portuguese Polar Program.

Gonçalo Vieira, Teresa Cabrita and Ana David

CONTENTS



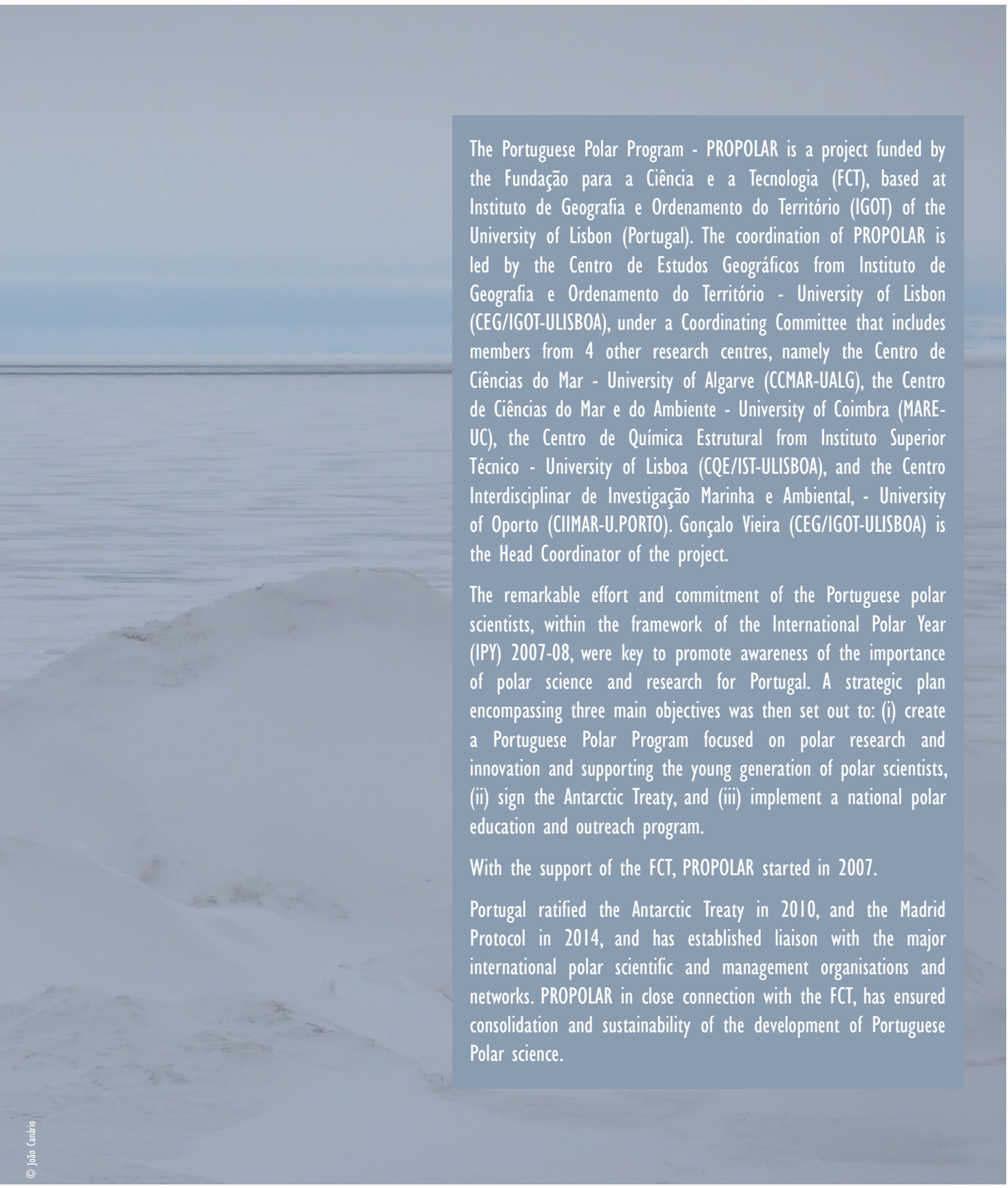
LIST OF ABBREVIATIONS AND ACRONYMS

AED	Automated External Defibrillator
ALOMAR	Arctic Lidar Observatory for Middle Atmosphere Research
APA	Agência Portuguesa do Ambiente
APECS-Portugal	Association of Polar Early Career Scientists-Portugal
ARICE	Arctic Research Icebreaker Consortium
ASMA	Antarctic Specially Managed Areas
ASPA	Antarctic Specially Protected Areas
ATCM	Antarctic Treaty Consultative Meeting
BAI	Bulgarian Antarctic Institute
BLS	Basic Life Support
CAA-CHINARE	Chinese Arctic and Antarctic Administration
CCMAR	Centro de Ciências do Mar
CEG	Centro de Estudos Geográficos
CEN	Centre d'Études Nordiques
CIIMAR	Centro Interdisciplinar de Investigação Marinha e Ambiental
CMDL	Centro de Medicina Desportiva de Lisboa
COMNAP	Council of Managers of National Antarctic Program
CPE	Comité Polar Espanhol
CPR	Cardiopulmonary Resuscitation
CQE	Centro de Química Estrutural
DNA	Dirección Nacional del Antártico
EPB	European Polar Board
ESA	European Space Agency
FARO	Forum of Arctic Research Operators
FCT	Fundação para a Ciência e a Tecnologia
IAA	Instituto Antártico Argentino
IACS	International Association for Cryospheric Sciences
IASC	International Arctic Science Committee
IGOT	Instituto de Geografia e Ordenamento do Território
INACH	Instituto Antártico Chileno
INRS	L'Institut National de la Recherche Scientifique
IPA	International Permafrost Association
IPDJ	Instituto Português do Desporto e Juventude
IPY	International Polar Year
IST	Instituto Superior Técnico
KOPRI	Korean Polar Research Institute
LoU	Letter of Understanding
MARE	Centro de Ciências do Mar e do Ambiente
MoU	Memorandum of Understanding
NGO	Non-governmental organization
NSF	National Science Foundation
PEI	Polar Educators International
PolReC	ITU Polar Research Center
PROANTAR	Programa Antártico Brasileiro
PROPOLAR	Portuguese Polar Program
RSPB	Royal Society for the Protection of Birds
SCAR	Scientific Committee for Antarctic Research
T-MOSAiC	Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Connections
U.PORTO	University of Oporto
UAI	Uruguayan Antarctic Institute
UALG	University of Algarve
UBI	University of Beira Interior
UC	University of Coimbra
ULISBOA	University of Lisbon
WWF	World Wildlife Fund

THE PROPOLAR

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

AN INTRODUCTION



The Portuguese Polar Program - PROPOLAR is a project funded by the Fundação para a Ciência e a Tecnologia (FCT), based at Instituto de Geografia e Ordenamento do Território (IGOT) of the University of Lisbon (Portugal). The coordination of PROPOLAR is led by the Centro de Estudos Geográficos from Instituto de Geografia e Ordenamento do Território - University of Lisbon (CEG/IGOT-ULISBOA), under a Coordinating Committee that includes members from 4 other research centres, namely the Centro de Ciências do Mar - University of Algarve (CCMAR-UALG), the Centro de Ciências do Mar e do Ambiente - University of Coimbra (MARE-UC), the Centro de Química Estrutural from Instituto Superior Técnico - University of Lisboa (CQE/IST-ULISBOA), and the Centro Interdisciplinar de Investigação Marinha e Ambiental, - University of Oporto (CIIMAR-U.PORTO). Gonçalo Vieira (CEG/IGOT-ULISBOA) is the Head Coordinator of the project.

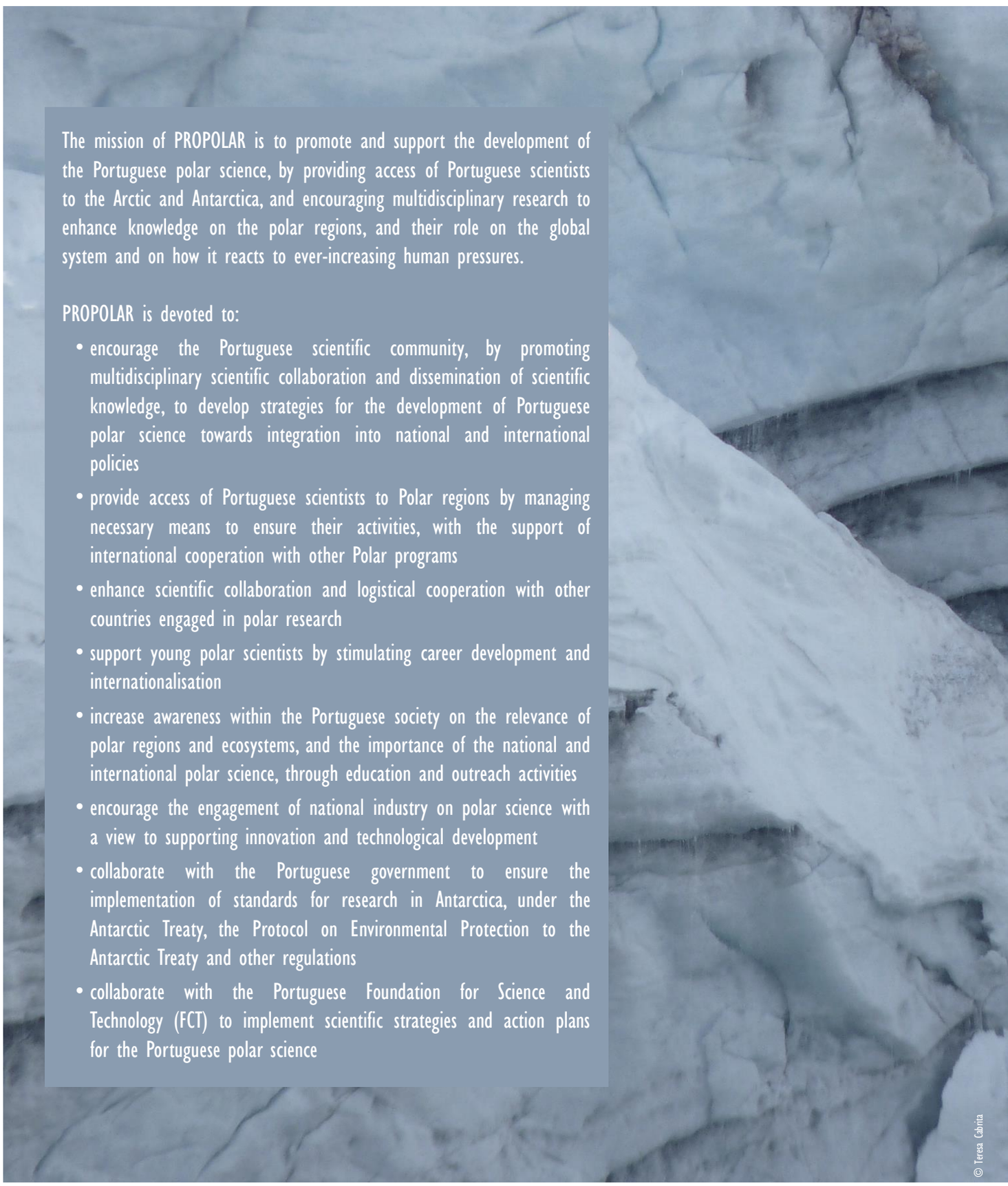
The remarkable effort and commitment of the Portuguese polar scientists, within the framework of the International Polar Year (IPY) 2007-08, were key to promote awareness of the importance of polar science and research for Portugal. A strategic plan encompassing three main objectives was then set out to: (i) create a Portuguese Polar Program focused on polar research and innovation and supporting the young generation of polar scientists, (ii) sign the Antarctic Treaty, and (iii) implement a national polar education and outreach program.

With the support of the FCT, PROPOLAR started in 2007.

Portugal ratified the Antarctic Treaty in 2010, and the Madrid Protocol in 2014, and has established liaison with the major international polar scientific and management organisations and networks. PROPOLAR in close connection with the FCT, has ensured consolidation and sustainability of the development of Portuguese Polar science.

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

MISSION AND OBJECTIVES



The mission of PROPOLAR is to promote and support the development of the Portuguese polar science, by providing access of Portuguese scientists to the Arctic and Antarctica, and encouraging multidisciplinary research to enhance knowledge on the polar regions, and their role on the global system and on how it reacts to ever-increasing human pressures.

PROPOLAR is devoted to:

- encourage the Portuguese scientific community, by promoting multidisciplinary scientific collaboration and dissemination of scientific knowledge, to develop strategies for the development of Portuguese polar science towards integration into national and international policies
- provide access of Portuguese scientists to Polar regions by managing necessary means to ensure their activities, with the support of international cooperation with other Polar programs
- enhance scientific collaboration and logistical cooperation with other countries engaged in polar research
- support young polar scientists by stimulating career development and internationalisation
- increase awareness within the Portuguese society on the relevance of polar regions and ecosystems, and the importance of the national and international polar science, through education and outreach activities
- encourage the engagement of national industry on polar science with a view to supporting innovation and technological development
- collaborate with the Portuguese government to ensure the implementation of standards for research in Antarctica, under the Antarctic Treaty, the Protocol on Environmental Protection to the Antarctic Treaty and other regulations
- collaborate with the Portuguese Foundation for Science and Technology (FCT) to implement scientific strategies and action plans for the Portuguese polar science

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

THE COORDINATION COMMITTEE AND EXECUTIVE TEAM

HEAD OF COORDINATING COMMITTEE

Gonçalo Vieira	Centro de Estudos Geográficos do Instituto de Geografia e Ordenamento do Território da Universidade de Lisboa (CEG/IGOT-ULISBOA)

COORDINATING COMMITTEE

Adelino Canário	Centro de Ciências do Mar da Universidade do Algarve (CCMAR-UALG)
Catarina Magalhães	Centro Interdisciplinar de Investigação Marinha e Ambiental da Universidade do Porto (CIIMAR-U.PORTO)
Gonçalo Vieira	Centro de Estudos Geográficos do Instituto de Geografia e Ordenamento do Território da Universidade de Lisboa (CEG/IGOT-ULISBOA)
João Canário	Centro de Química Estrutural do Instituto Superior Técnico da Universidade de Lisboa (CQE/IST-ULISBOA)
José Xavier	Centro de Ciências do Mar e do Ambiente da Universidade de Coimbra (MARE-UC)

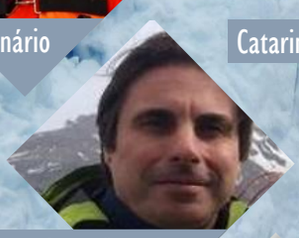
EXECUTIVE TEAM

Teresa Cabrita	CEG/IGOT-ULISBOA, Executive Director
Ana David	CEG/IGOT-ULISBOA, Secretariat and Logistics and Communications Manager


Adelino Canário


Catarina Magalhães


Gonçalo Vieira


João Canário


José Xavier


Teresa Cabrita


Ana David

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

THE HOST INSTITUTION

INSTITUTO DE GEOGRAFIA E ORDENAMENTO DO TERRITÓRIO - IGOT
INSTITUTE OF GEOGRAFY AND SPATIAL PLANNING

The Institute of Geography and Spatial Planning of the University of Lisbon is the only school in Portugal entirely devoted to teaching and research in the fields of Geography and Spatial Planning.

IGOT integrates the oldest and most renowned Geography Research Unit in the country, the Centre for Geographical Studies (CEG), conducting research recurrently referred to as Excellent by independent international panels of experts (ranked by the Portuguese Foundation for Science and Technology - FCT).

IGOT is Portugal's number one school of Geography, reaching the TOP100 of the best Schools of Geography of the World in 2017, according to the QS World University Rankings by Subject. Jointly with Universities in Spain, Mexico and Brazil, IGOT leads in the Iberian America and is among the best Schools of Geography in Europe.

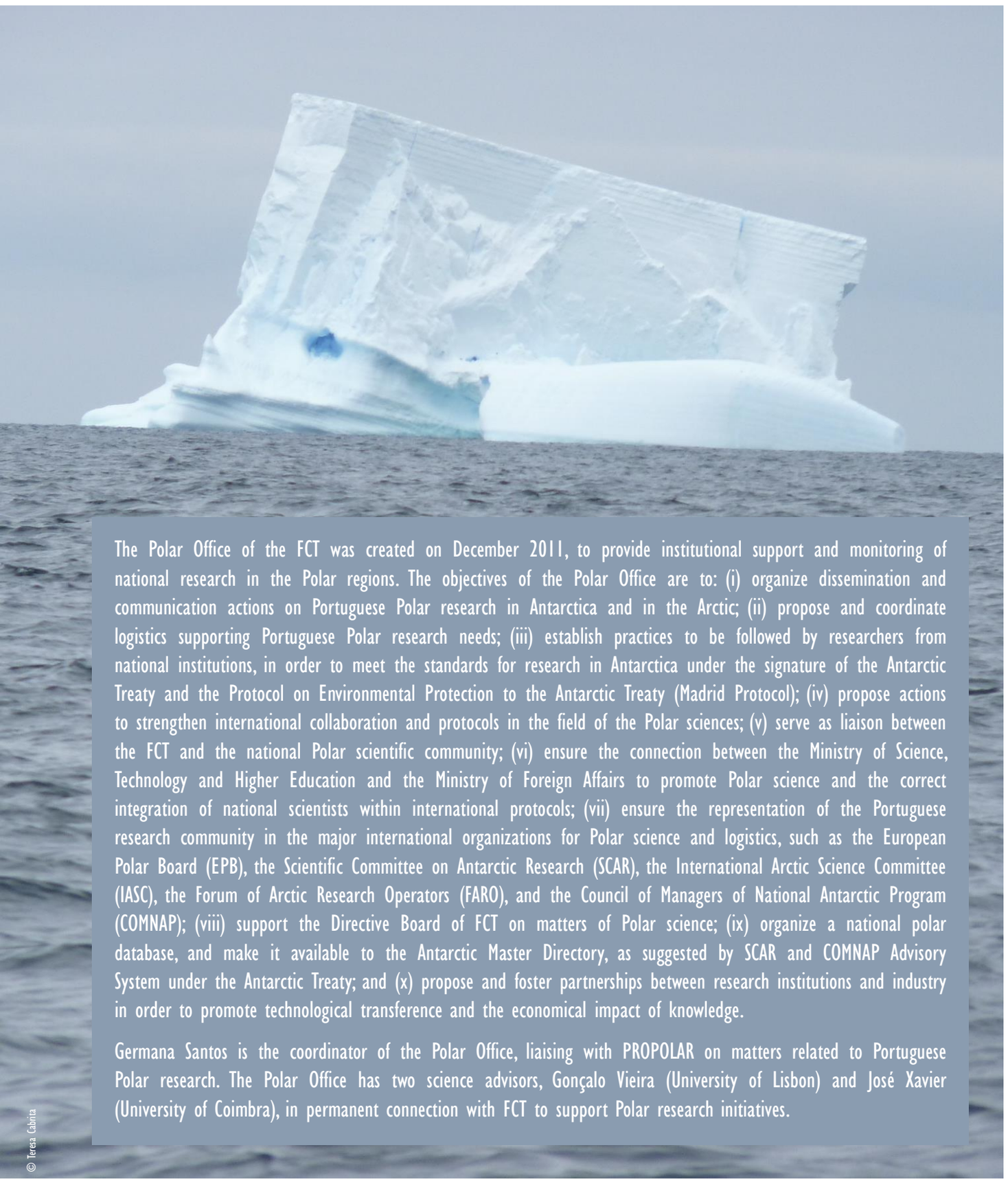
The mission of IGOT is to (i) promote top quality higher education at the undergraduate, graduate and lifelong learning levels; (ii) carry out research and development activities; and (iii) disseminate knowledge and provide specialized scientific and technical consultancy services to society-at-large, all in the fields of geography, spatial planning, development policies and territorial cohesion, urban and environmental studies, as well as resource, risk and socio-spatial dynamics and organisational planning. IGOT is a member of the Association of European Planning Schools (AESOP) and is home to faculty stuff and highly qualified researchers with a vast scientific expertise, who are highly recognised internationally, and strongly focused on research and teaching at the highest international standards. Teaching personnel is integrated into the research groups that comprise CEG, a prestigious research and development centre in Portugal in the various fields of Geography and Spatial Planning. The articulation between teaching and research allows students at IGOT to expand their training and acquire skills from an interdisciplinary perspective, an essential and central aspect needed to ensure access to a wide range of professions, be it in the world of business, public administration or NGOs. IGOT is located at the University of Lisbon in a modern, functional building that guarantees all the conditions needed to ensure excellence in teaching and research.

Participants of the Polar Campaign Preparation Meeting, organized by PROPOLAR, in November 2018, in front of the IGOT building, in Lisbon.

© Teresa Cabrita

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

THE POLAR OFFICE - PORTUGUESE FOUNDATION FOR SCIENCE AND TECHNOLOGY (FCT)

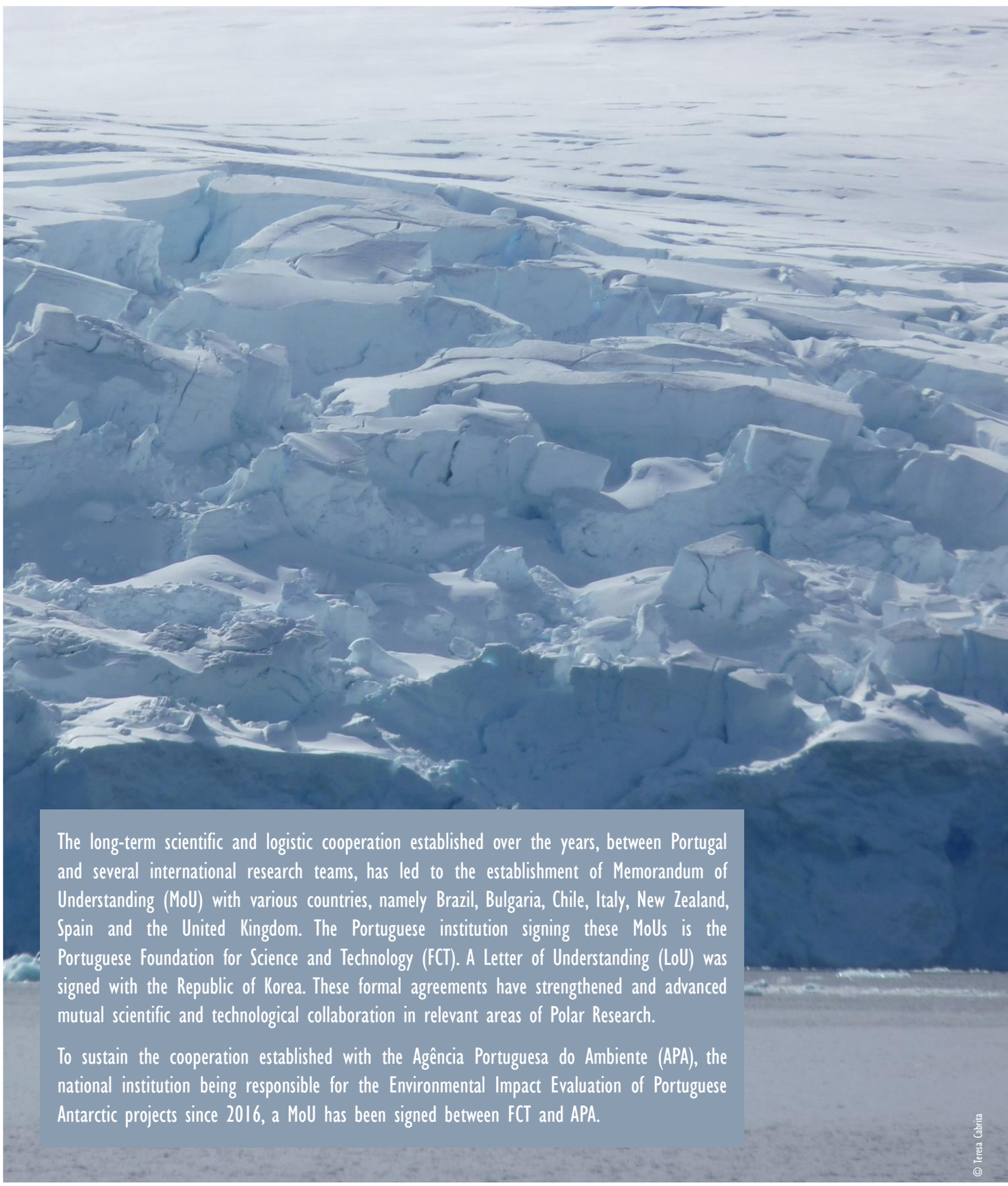


The Polar Office of the FCT was created on December 2011, to provide institutional support and monitoring of national research in the Polar regions. The objectives of the Polar Office are to: (i) organize dissemination and communication actions on Portuguese Polar research in Antarctica and in the Arctic; (ii) propose and coordinate logistics supporting Portuguese Polar research needs; (iii) establish practices to be followed by researchers from national institutions, in order to meet the standards for research in Antarctica under the signature of the Antarctic Treaty and the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol); (iv) propose actions to strengthen international collaboration and protocols in the field of the Polar sciences; (v) serve as liaison between the FCT and the national Polar scientific community; (vi) ensure the connection between the Ministry of Science, Technology and Higher Education and the Ministry of Foreign Affairs to promote Polar science and the correct integration of national scientists within international protocols; (vii) ensure the representation of the Portuguese research community in the major international organizations for Polar science and logistics, such as the European Polar Board (EPB), the Scientific Committee on Antarctic Research (SCAR), the International Arctic Science Committee (IASC), the Forum of Arctic Research Operators (FARO), and the Council of Managers of National Antarctic Program (COMNAP); (viii) support the Directive Board of FCT on matters of Polar science; (ix) organize a national polar database, and make it available to the Antarctic Master Directory, as suggested by SCAR and COMNAP Advisory System under the Antarctic Treaty; and (x) propose and foster partnerships between research institutions and industry in order to promote technological transference and the economical impact of knowledge.

Germana Santos is the coordinator of the Polar Office, liaising with PROPOLAR on matters related to Portuguese Polar research. The Polar Office has two science advisors, Gonçalo Vieira (University of Lisbon) and José Xavier (University of Coimbra), in permanent connection with FCT to support Polar research initiatives.

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

MEMORANDA OF UNDERSTANDING (MoU)

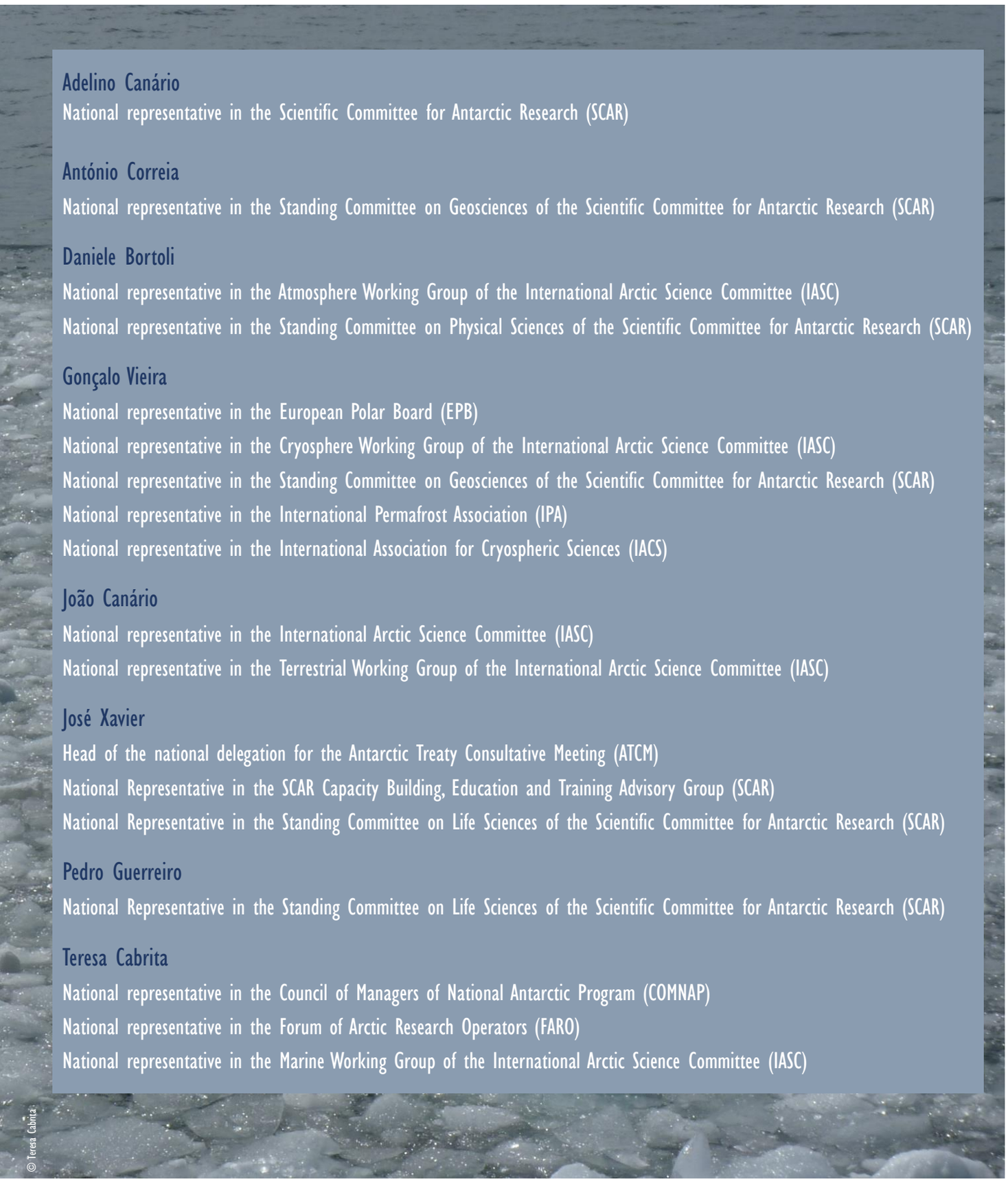


The long-term scientific and logistic cooperation established over the years, between Portugal and several international research teams, has led to the establishment of Memorandum of Understanding (MoU) with various countries, namely Brazil, Bulgaria, Chile, Italy, New Zealand, Spain and the United Kingdom. The Portuguese institution signing these MoUs is the Portuguese Foundation for Science and Technology (FCT). A Letter of Understanding (LoU) was signed with the Republic of Korea. These formal agreements have strengthened and advanced mutual scientific and technological collaboration in relevant areas of Polar Research.

To sustain the cooperation established with the Agência Portuguesa do Ambiente (APA), the national institution being responsible for the Environmental Impact Evaluation of Portuguese Antarctic projects since 2016, a MoU has been signed between FCT and APA.

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

REPRESENTATION IN INTERNATIONAL ORGANIZATIONS



Adelino Canário

National representative in the Scientific Committee for Antarctic Research (SCAR)

António Correia

National representative in the Standing Committee on Geosciences of the Scientific Committee for Antarctic Research (SCAR)

Daniele Bortoli

National representative in the Atmosphere Working Group of the International Arctic Science Committee (IASC)

National representative in the Standing Committee on Physical Sciences of the Scientific Committee for Antarctic Research (SCAR)

Gonçalo Vieira

National representative in the European Polar Board (EPB)

National representative in the Cryosphere Working Group of the International Arctic Science Committee (IASC)

National representative in the Standing Committee on Geosciences of the Scientific Committee for Antarctic Research (SCAR)

National representative in the International Permafrost Association (IPA)

National representative in the International Association for Cryospheric Sciences (IACS)

João Canário

National representative in the International Arctic Science Committee (IASC)

National representative in the Terrestrial Working Group of the International Arctic Science Committee (IASC)

José Xavier

Head of the national delegation for the Antarctic Treaty Consultative Meeting (ATCM)

National Representative in the SCAR Capacity Building, Education and Training Advisory Group (SCAR)

National Representative in the Standing Committee on Life Sciences of the Scientific Committee for Antarctic Research (SCAR)

Pedro Guerreiro

National Representative in the Standing Committee on Life Sciences of the Scientific Committee for Antarctic Research (SCAR)

Teresa Cabrita

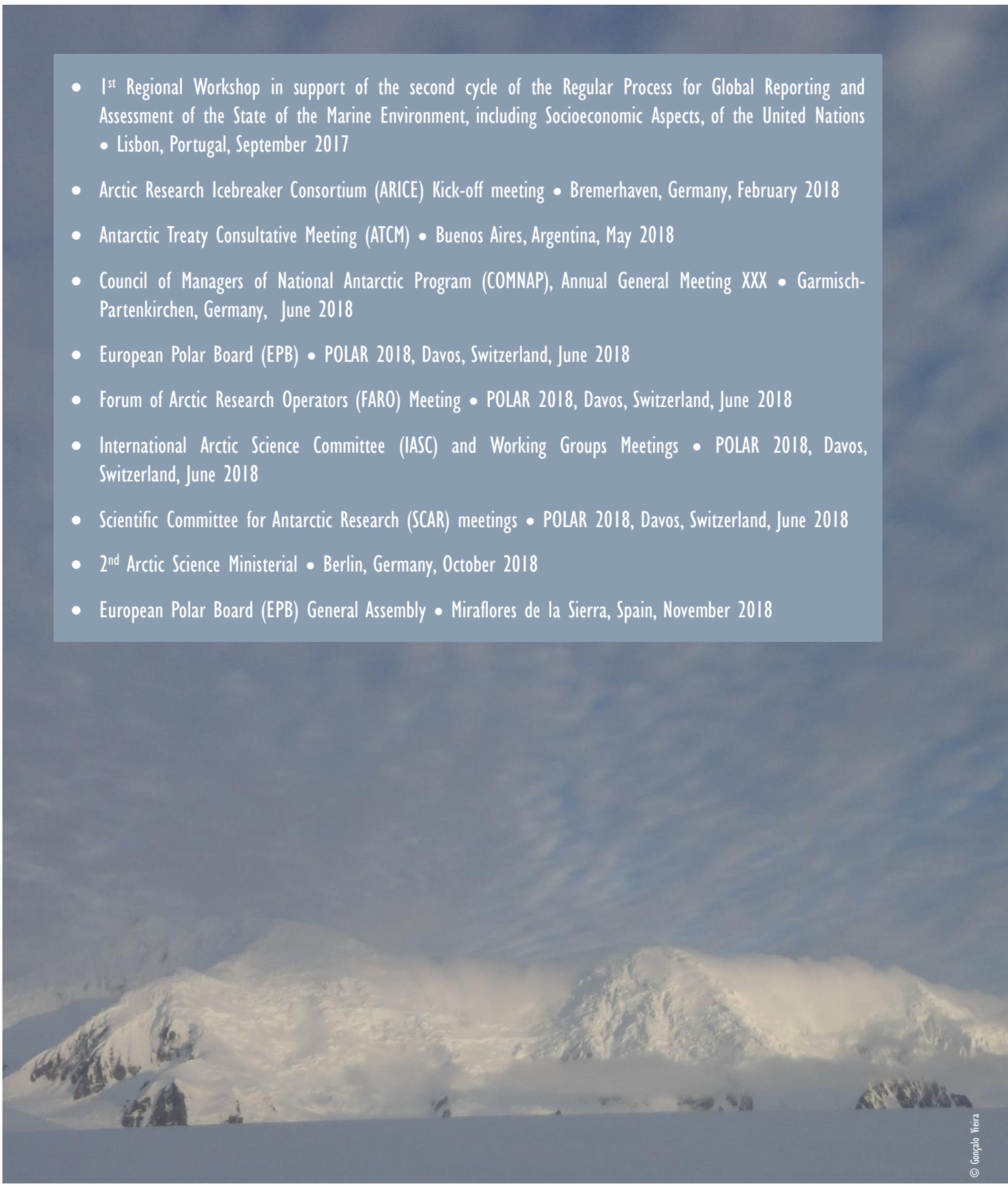
National representative in the Council of Managers of National Antarctic Program (COMNAP)

National representative in the Forum of Arctic Research Operators (FARO)

National representative in the Marine Working Group of the International Arctic Science Committee (IASC)

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

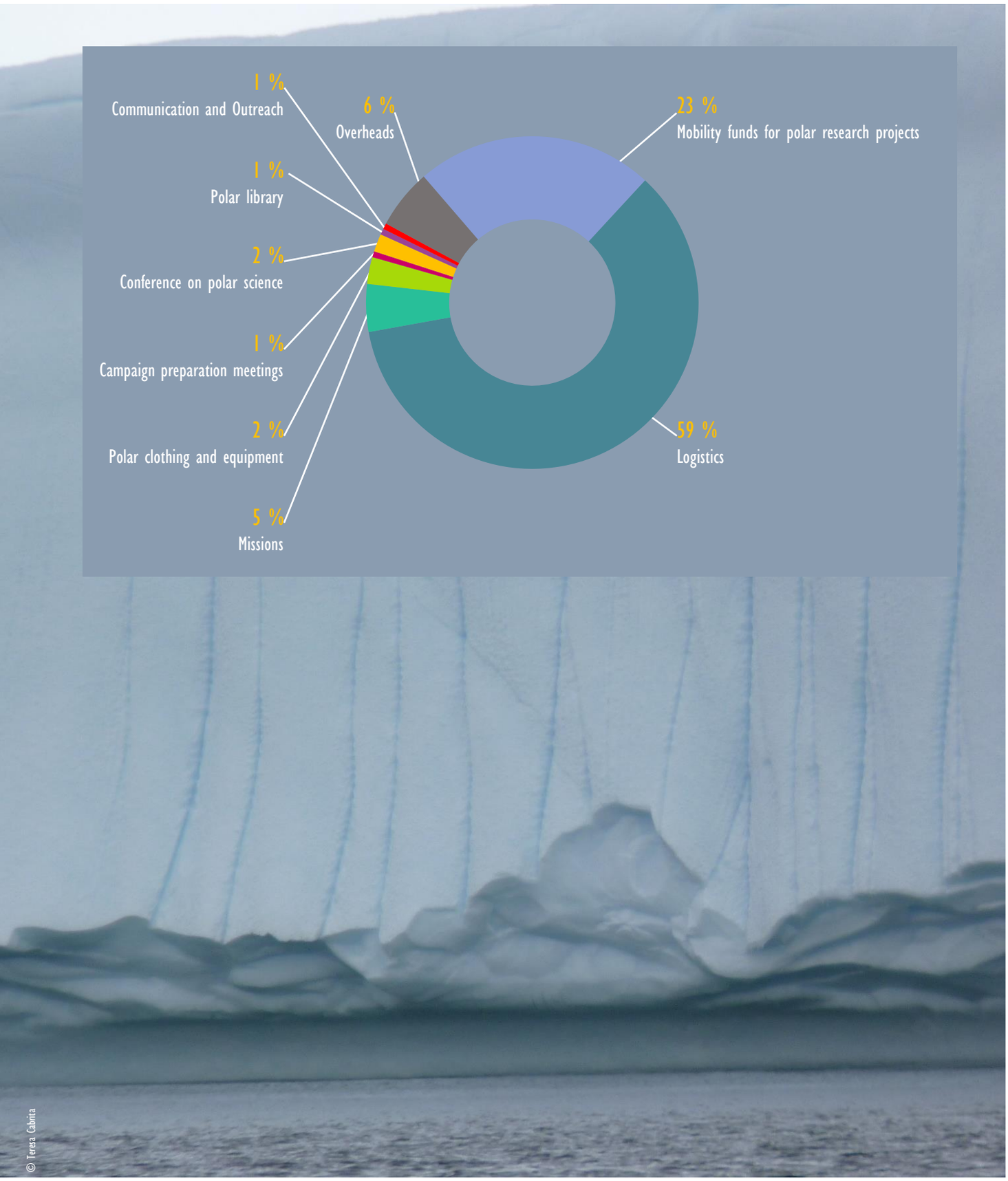
PARTICIPATION IN INTERNATIONAL MEETINGS



- 1st Regional Workshop in support of the second cycle of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, of the United Nations • Lisbon, Portugal, September 2017
- Arctic Research Icebreaker Consortium (ARICE) Kick-off meeting • Bremerhaven, Germany, February 2018
- Antarctic Treaty Consultative Meeting (ATCM) • Buenos Aires, Argentina, May 2018
- Council of Managers of National Antarctic Program (COMNAP), Annual General Meeting XXX • Garmisch-Partenkirchen, Germany, June 2018
- European Polar Board (EPB) • POLAR 2018, Davos, Switzerland, June 2018
- Forum of Arctic Research Operators (FARO) Meeting • POLAR 2018, Davos, Switzerland, June 2018
- International Arctic Science Committee (IASC) and Working Groups Meetings • POLAR 2018, Davos, Switzerland, June 2018
- Scientific Committee for Antarctic Research (SCAR) meetings • POLAR 2018, Davos, Switzerland, June 2018
- 2nd Arctic Science Ministerial • Berlin, Germany, October 2018
- European Polar Board (EPB) General Assembly • Miraflores de la Sierra, Spain, November 2018

THE PORTUGUESE POLAR PROGRAM - PROPOLAR

BUDGET ALLOCATION

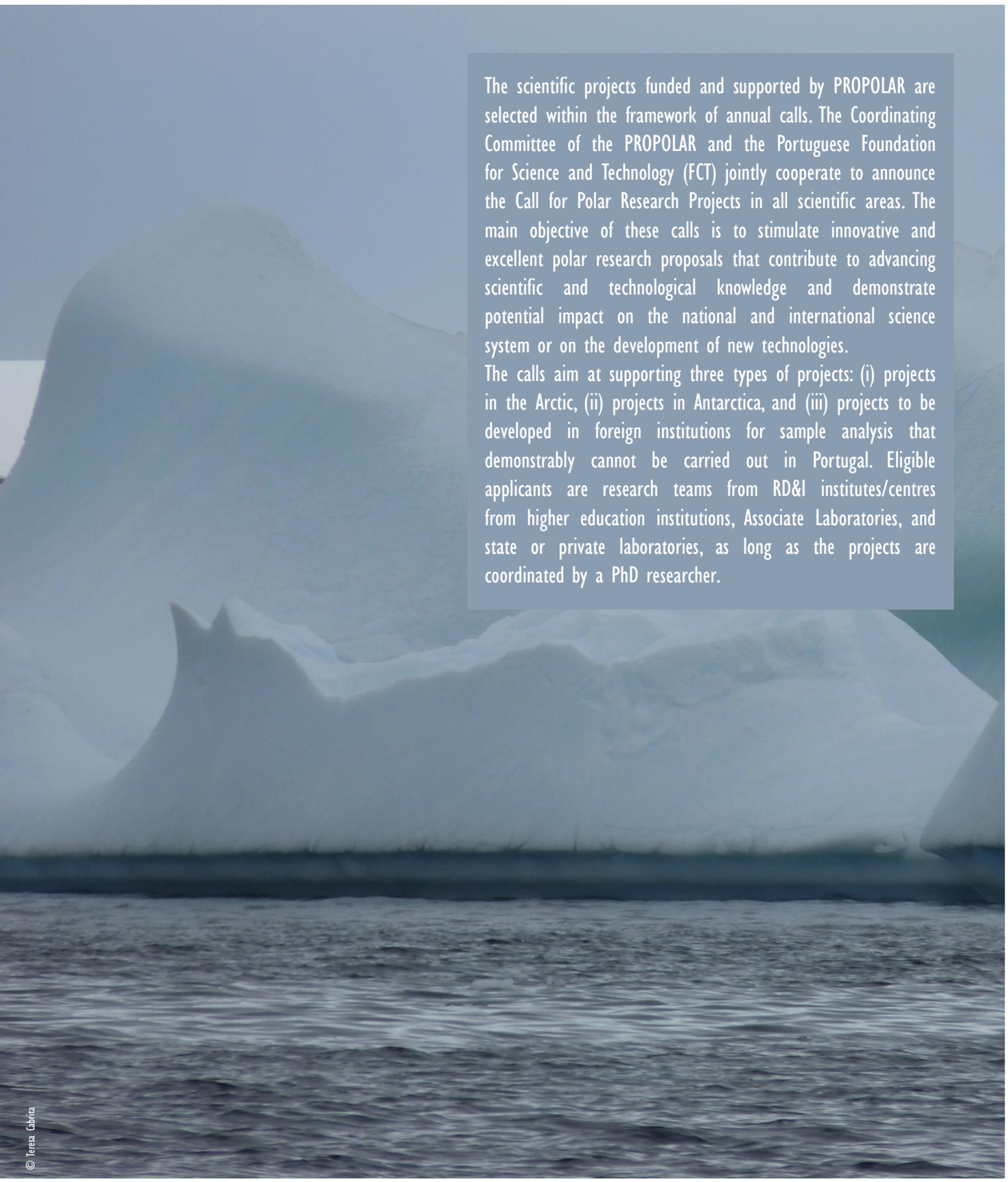


© Teresa Cabrita

THE PROJECTS

SCIENTIFIC PROJECTS 2017-18

CALL 2017-18

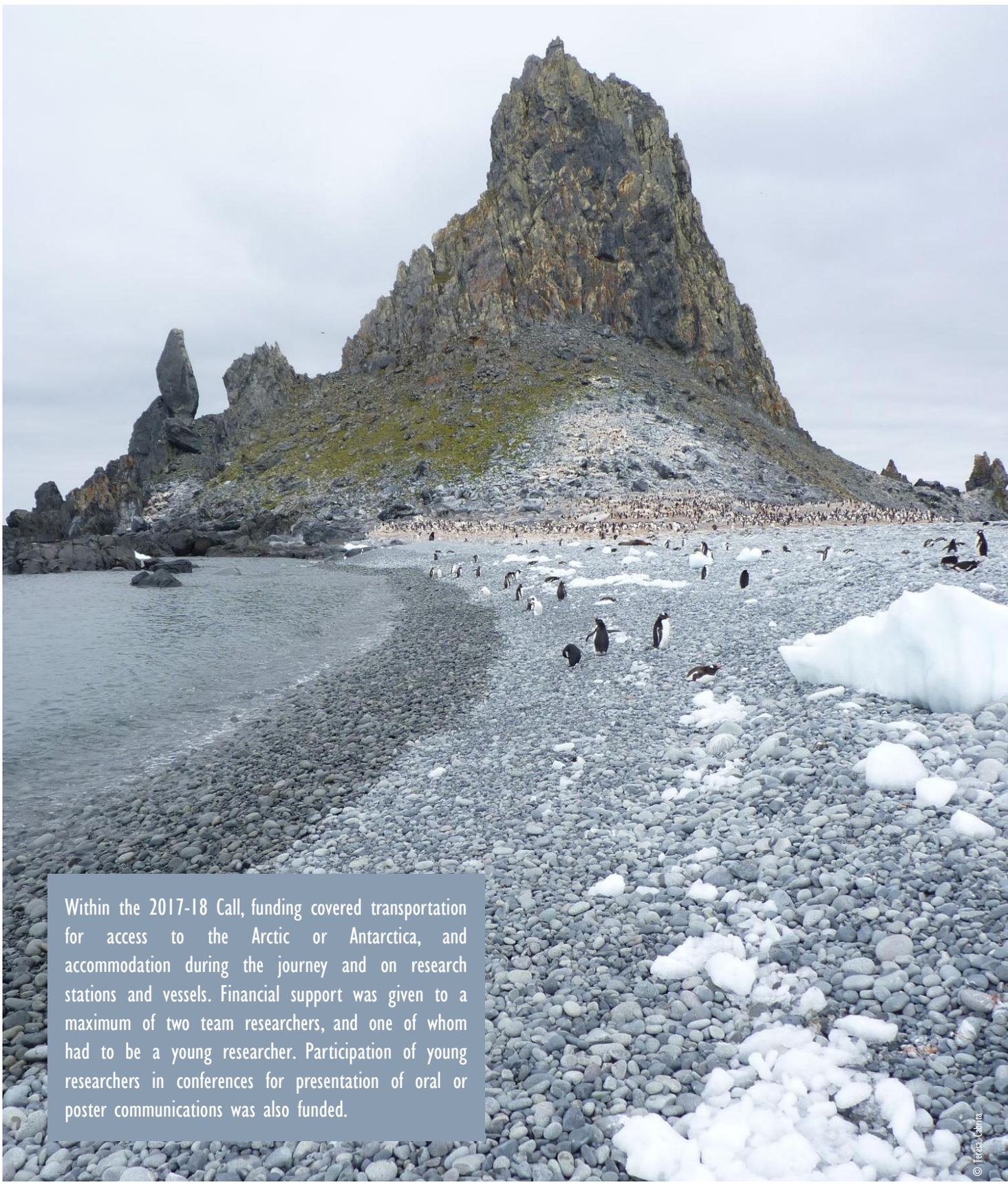


The scientific projects funded and supported by PROPOLAR are selected within the framework of annual calls. The Coordinating Committee of the PROPOLAR and the Portuguese Foundation for Science and Technology (FCT) jointly cooperate to announce the Call for Polar Research Projects in all scientific areas. The main objective of these calls is to stimulate innovative and excellent polar research proposals that contribute to advancing scientific and technological knowledge and demonstrate potential impact on the national and international science system or on the development of new technologies.

The calls aim at supporting three types of projects: (i) projects in the Arctic, (ii) projects in Antarctica, and (iii) projects to be developed in foreign institutions for sample analysis that demonstrably cannot be carried out in Portugal. Eligible applicants are research teams from RD&I institutes/centres from higher education institutions, Associate Laboratories, and state or private laboratories, as long as the projects are coordinated by a PhD researcher.

SCIENTIFIC PROJECTS 2017-18

CALL 2017-18



Within the 2017-18 Call, funding covered transportation for access to the Arctic or Antarctica, and accommodation during the journey and on research stations and vessels. Financial support was given to a maximum of two team researchers, and one of whom had to be a young researcher. Participation of young researchers in conferences for presentation of oral or poster communications was also funded.

SCIENTIFIC PROJECTS 2017-18

RESULTS OF THE CALL

For the polar campaign 2017-18, the call was launched on the 12th of June 2017, in close collaboration between the PROPOLAR and the Polar Office (FCT). Information sessions to support the preparation of the scientific proposals were made available. Sixteen applications were received, 9 to be developed in the Antarctic, 5 in the Arctic and 2 to be developed in foreign institutions. Evaluation of the proposals followed logistical and scientific procedures. The logistical evaluation was carried out by the PROPOLAR to ensure that the proposals fell within the scope of the existing logistic possibilities of the program. The scientific evaluation was entrusted to groups of 3 independent experts per proposal, both national and international, who were asked to grade the scientific and technical value of the proposals submitted, as well as the suitability of the researchers' curricula. Fifteen proposals received scientific approval, and 13 projects with highest marks were funded. Five projects were carried out in the Arctic, 6 in Antarctica, and 1 developed in a foreign institution.

LEGEND FOR PROJECT FEATURES

- Principal investigator
- Team in the field
- Project type
- Funding institution
- Protected area visited
- Location

PROJECTS in the ARCTIC

AMS III

UNRAVELLING THE STRENGTH OF CARRY-OVER EFFECTS ON ARTIC MIGRATORY SHOREBIRDS

Pedro Miguel Araújo, Marine Environmental Sciences Centre (MARE), University of Coimbra, Portugal

Pedro Miguel Araújo

Research project in the Arctic

PROPOLAR

Reykjavik, Iceland • South Iceland Research Centre, Iceland University

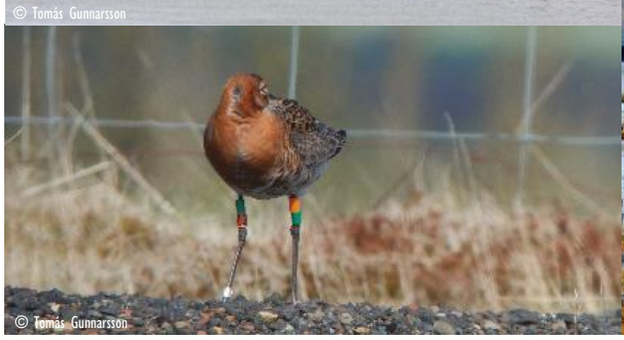
Pedro Araújo

Conversion of natural habitats for agricultural proposes is a primary driver of global biodiversity loss and the rice-fields adjacent to Portuguese estuaries increasingly provide lodging and foraging habitat for large numbers of migratory shorebirds throughout the winter. Land use changes occurring at very distant locations may have direct detrimental consequences for arctic migratory shorebirds as it requires species to respond to complete migration towards the arctic. Land conversion and associated changes means that shorebirds have either to adapt metabolism to store fat from alternative dietary sources. This project aims at quantifying differences in fat composition on Icelandic Godwits to: (i) understand the ecological implications of changes in wintering habitats at their arrival sites in the Arctic, and (ii) understand if subcutaneous fat composition differences between individuals, reflecting arrival rank in Iceland (an established proxy of breeding habitat quality).

© Tómas Gunnarsson

UNRAVELLING THE STRENGTH OF CARRY-OVER EFFECTS ON ARTIC MIGRATORY SHOREBIRDS

Migratory shorebirds have evolved different strategies to deal with long distance flight, with most species using stopover sites to refuel along their journeys. However, the frequency of these events limits migration speed and therefore migrants face trade-offs between refueling events and carrying heavier fuel reserves. Most shorebirds are long distance migrants with high capacity to store and rapidly use adipose tissues and they have a very tight annual schedule. During migratory flights shorebirds can mobilize accumulated fat reserves, in order to meet the energetic demands of flight to link habitats in the artic and sub-arctic to temperate and tropical areas in both hemispheres. The ability to mobilize fat reserves is paramount for migratory birds, and different feeding strategies can reflect different physiological patterns in fat mobilization. In this framework, Icelandic godwits are an excellent model species, since prior to migration they predominantly consume aquatic invertebrates (e.g. Tagus estuary), but they increasingly rely on rice at many Iberian sites (e.g. Tagus rice-fields). Given that polyunsaturated fatty acids PUFA content of rice seeds is dramatically different than that of aquatic invertebrates, the ratio of omega-6:omega-3 PUFA in fat stores of refueling godwits should vary according to food type and stopover site. Despite ongoing conservation efforts, many shorebird populations are declining, in some cases at alarming rates. Given that human pressure to produce food will continue, conservation actions must be identified and integrated management practices must be developed. By sampling Icelandic godwits at arrival sites in their breeding areas (e.g. Iceland), we will be able to understand the migratory and ecological implications of a dietary shift from a omega-3 PUFA diet to an omega-6 PUFA diet and identify the potential effects of habitat changes in the wintering areas for an arctic population of migrant birds.



GEOWHIMBREL III

EFFECTS OF LONG-DISTANCE MIGRATION ON INDIVIDUAL FITNESS

José Alves, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal

José Alves, Camilo Carneiro (CESAM), Tómas Gunnarsson (South Iceland Research Centre, Iceland)

Research project in the Arctic

PROPOLAR • South Iceland Research Centre

Reykjavik Iceland • South Iceland Research Centre, Iceland University • Ireland


José Alves


Camilo Carneiro

One of the most widely reported responses to environmental change in recent years are changes in migratory phenology of bird species. Arctic and sub-arctic breeding shorebirds face several of the most preeminent impacts of global environmental change. Arctic habitats currently experience the highest rates of warming temperatures potentially leading to mismatches on resource availability in nesting sites and/or food for these species. Upon leaving the arctic, shorebirds migrate to coastal areas in the temperate and tropical zones where they spend the non-breeding season. These areas are currently under intense anthropogenic pressure with many being converted into recreational or industrial areas. Indeed, many migratory bird populations are currently declining and such declines are particularly apparent in the Afro-Palearctic system. Understanding these species' and individuals' ability in responding to changing environment is likely to be key in altering their demographic trends.


© Tomás Gunnarsson

EFFECTS OF LONG-DISTANCE MIGRATION ON INDIVIDUAL FITNESS

Polar and sub-arctic regions are experiencing particularly rapid rates of climate change and the majority of animals using these habitats are migratory. Changes to migratory behavior are amongst the most widely reported responses to environmental change throughout the world, but the individual and population-level consequences of these changes are unknown. Within migratory populations, early arrival to the breeding grounds can potentially confer fitness benefits through processes such as acquiring better territories, earlier laying dates and increased numbers of nesting attempts. At higher latitudes current changes in climatic conditions, such as earlier spring warming that facilitate earlier nesting may therefore disproportionately improve the breeding success of early arriving individuals, if they occupy territories earlier in the season. The consequences of such changes for population size and distribution will depend on the factors determining individual migratory strategy, as well, as the strength of carry-over effects from the previous wintering season. Iceland supports internationally important populations of many avian migrants and due to its geographical location, landbirds must undertake a sea crossing in excess of 800 km to the breeding areas. The costs associated with this may be considerable, given the absence of stop-over sites in which to shelter if unfavorable weather conditions are encountered *en route*. However, we have recently identified a novel migration strategy in which Icelandic whimbrels (*Numenius phaeopus islandicus*) reach their wintering locations in West Africa and return to their Icelandic breeding areas in two single flights, covering ca. 11000 Km over oceanic waters. Such strategy is unique in land-birds for which an alternative coastal route is available and likely involves considerable trade-offs between early arrival and the acquisition of good breeding conditions, which will ultimately influence individual fitness.

No study on long distance migrants has established individual fitness consequences resulting from differences in wintering area, migration strategy and breeding conditions. Those parameters will be quantified and linked to individual fitness, using remote tracking techniques combined with field measurements, according to the goals: (i) quantify individual variation in migration strategies (arrival timings, distance, winter site, stopover period, flight costs), (ii) determine individual (timing of arrival and laying, reproductive investment) and site-based (breeding density, food availability, proportion of successful breeders) variation in demographic drivers on breeding grounds, (iii) establish strength and fitness consequences of carry-over effects by linking previous objectives and determine its population effects by scaling up individual effects according to breeding and migration strategy.


© Camilo Carneiro


© Camilo Carneiro


© Tómas Gunnarsson


© Verónica Mendez

NITROnice II

BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal

Catarina Magalhães, António Sousa (CIIMAR)

Research project in the Arctic

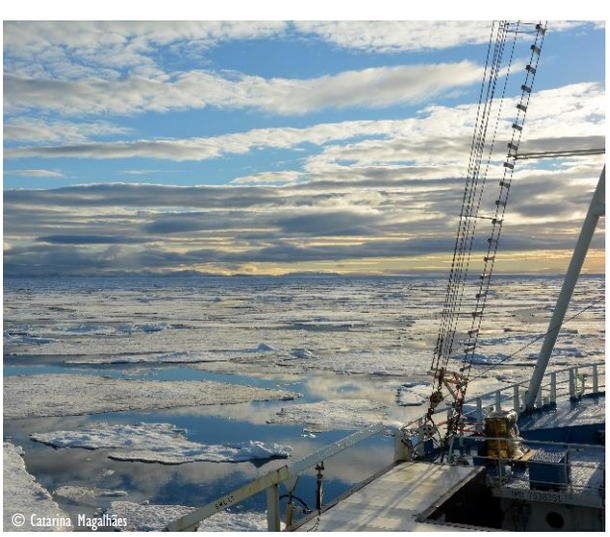
PROPOLAR • Norwegian Polar Institute

Longyearbyen, Svalbard Archipelago, Arctic

Catarina Magalhães

António Sousa

Over the last 30 years, sea ice that covers the Arctic Ocean has been retreating, in area and extent, but not as fast as has been the thinning. The thinner and younger sea-ice regime, that the Arctic has been facing, changed the phytoplankton dynamics and Arctic's biogeochemistry. Understand the sources of nitrogen that will feed this new productivity dynamics will be worthwhile in order to draw future trends. In NITROnice II project we propose to continue our participation in an ongoing NPI (Norwegian Polar Institute) monitoring program by providing a comprehensive temporal and spatial study on the importance of N cycle pathways and microbial communities in the Arctic Ocean by combining biogeochemical and metagenomic approaches. Being supported and integrated in an international and multidisciplinary monitoring program, this project will help to complete the roadmap of N cycle, and outlining the role of N recycling microbial communities in the Arctic, facing a changing environment.

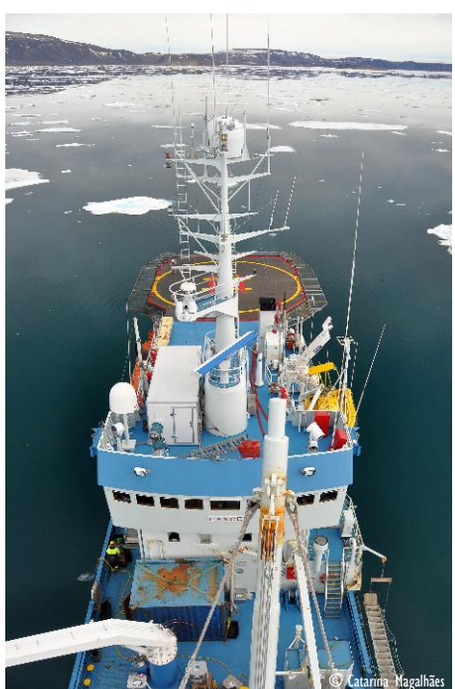


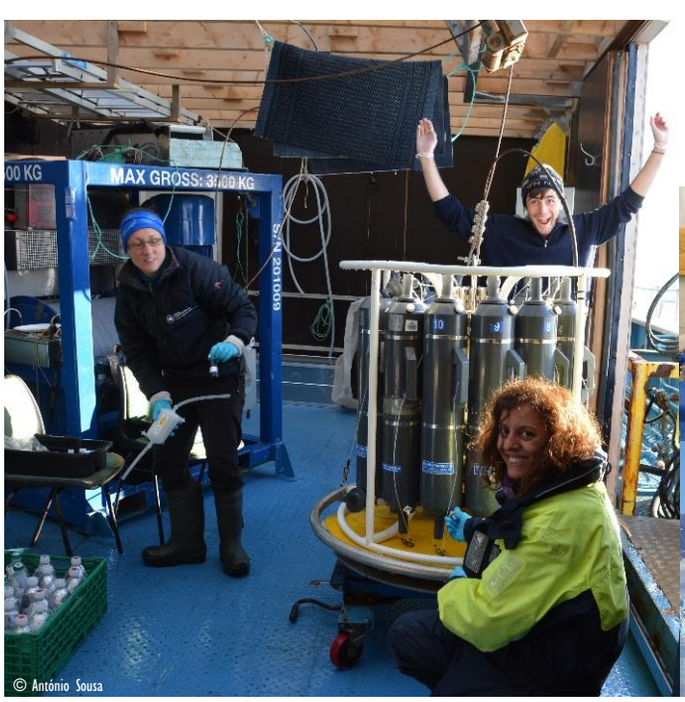
© Catarina Magalhães

BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

One of the few pristine environments on Earth, the Arctic Ocean, has been facing increasing anthropogenic pressures. The consequences of global warming, seawater acidification and sea oil drilling are reflected upon ice related ecosystems visible by the sea ice regression over the last decades that reached a historical minimum during the 2012 summer. In addition, the substitution of multi-layer sea ice from many years by one thin layer of one-year time that has been observed aids to amplify the ecological impact of sea ice loss being one of the main concerns today. These changes have consequences on the physical properties of ice, with clear impacts at the Earth's climate system, and the Arctic ecosystems, including on physical, chemical, biogeochemical and biological compartments. Indeed, the thinner and younger sea-ice regime, that the Arctic has been facing, changed the phytoplankton dynamics and Arctic's biogeochemistry. Understand the sources of nitrogen that will feed this new dynamic, it'll be worthwhile in order to draw future trends. Important sources to the availability of nitrogen are the activity of nitrifiers and diazothophic cyanobacteria. Despite, the high richness of the nitrogen-fixing gene nifH found in the Central Arctic Ocean, few belong to cyanobacteria, that are nearly absent in this region. Therefore, new evidences suggest that organic nitrogen sources, like urea, could play a major role in this polar ecosystem. Nevertheless, these areas are still poor characterized specially at north of Svalbard that experience unique oceanographic and biological features. NITROnice II project intend to overcome this gap, by providing a high- throughput metagenomic and biogeochemical study at both spatial and temporal scale to understand the Nitrogen biogeochemical implications of the changing Arctic and unveil new functional groups related to nitrogen availability in the Arctic Ocean.

In NITROnice II we aim to proceed with a comprehensive and detailed study to investigate the expansion of the Arctic environmental changes in shaping the distribution of N microbial biodiversity and functions, and to understand the limits and the plasticity of N metabolic pathways in supporting Arctic Ocean Primary productivity and system integrity. In addition, we intend to pinpoint and understand how the physical and chemical environmental variables limit the distribution and activity of N microbial communities and pathways. To accomplish our goals we will evaluate the distribution, activity, frequency and diversity of the microbial communities and target genes involved in the N biogeochemical processes across two oceanographic transects in Kongsfjorden and in the Marginal Ice Zone around Svalbard.





PERMACHEM II

BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal

João Canário, Diogo Ferreira (CQE)

Research project in the Arctic

PROPOLAR • CQE • University of Aveiro

Kuujjuarapik, Quebec, Canada

João Canário

Diogo Ferreira

PERMACHEM II is the Portuguese contribution to an Integrated Permafrost System Science approach that focuses on how changing permafrost and snowfall affect landscapes, water and wildlife, and the implications for the Northern communities and industries that depend on these resources. In this project, the Portuguese team has been responsible for providing physical and chemical data for better understanding the biogeochemical processes on thawing permafrost. This work has been focusing particularly in the chemical transformations in the carbon, sulphur and key contaminants cycling. PERMACHEM II also intends to estimate environmental impacts on those transformations in the aquatic ecosystems environmental quality and possibly to wildlife. The project will focus on the study of chemical composition of natural organic matter and its role on lake chemistry and greenhouse gases release. Simultaneously, Hg methylation and demethylation rates will be estimated to complement data obtained during the 2016/2017 season.

© João Canário

BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

Public interest in the Arctic climate change has been focused upon sea ice retreat and the associated effects on marine biota. Yet the changes being observed on permafrost lands in the Arctic (and Sub-Arctic) are equally pronounced, with direct impacts on the ecosystems. Large quantities of carbon are stored in permafrost soils within the Arctic. A warming climate induce environmental changes that accelerate the microbial breakdown of organic carbon and the release of greenhouse gases (GHG). One of the most known features of permafrost degradation are the formation of thaw lakes. These lakes are widespread in Arctic and contribute to global carbon cycling. Moreover, these highly dynamic systems are not only a source of GHG to the atmosphere but also deliver huge amounts of natural organic matter (NOM), nutrients and metals to themselves and to the adjacent aquatic systems. NOM composition in thaw lakes is a very complex mixture of molecules far from being known. The use of several analytical techniques has been used to characterize NOM in thaw lakes. However, so far there is still very few information about at least, the functional groups. Several works report the presence of fulvic or humic acids, the NOM characterization in terms of optical properties and, in more simple systems the estimation of compound classes or the existence of labile organic compounds. However, the scientific knowledge of this subject is fundamental to understand lake chemistry, NOM degradation and consequently the release of GHG.

In this follow-up project, we aim to improve our knowledge on the chemical composition of NOM in permafrost thaw lakes and their role in other lake biogeochemical processes. In parallel we also want to estimate Hg methylation and MeHg demethylation rates in these systems in order to understand the higher MeHg levels determined during 2017 fieldwork. Thus, the objectives for PERMAFROST II are: (i) decode the structural composition of NOM from two different SAS thermokarst lakes, and (ii) estimate Hg methylation and MeHg methylation rates in permafrost thaw lakes and compare with other lakes in the area but with different origin. The accomplished of these objectives coupled with the other results from the Canadian teams in the field will allow to better understand the chemistry of this lakes and how it may affect, for example, the release of GHG.


© João Canário


© João Canário

POLARUBI 2017-18

ELEMENTAL AND INDIVIDUAL PARTICLE ANALYSIS OF ATMOSPHERIC AEROSOLS FROM THE ARCTIC REGION

Sandra Mogo, University of Beira Interior (UBI), Portugal

Ana Barroso (University of Coimbra, Portugal) • Victoria Cachorro (Universidade of Valladolid, Spain)

Research project in the Arctic

PROPOLAR

Norway, Arctic Lidar Observatory for Middle Atmosphere Research (ALOMAR), Andøya Space Center (ASC)


Sandra Mogo


Ana Barroso


Victoria Cachorro

POLARUBI 2017-18 continues the work developed during the 2016 and 2017 PROPOLAR campaigns about PM10 atmospheric aerosols in a clean environment located 300 km north of the Arctic Circle, Andenes. The aerosol concentration and size distribution are to be obtained as well as the chemical composition and the morphology of the individual atmospheric aerosols. The techniques used are gravimetry, transmission electron microscopy (TEM) and scanning electron microscopy with energy dispersive x-ray analysis (SEM/EDX). The data obtained *in situ* is to be studied together with the columnar data obtained from the CIMEL sun radiometer located at the same station. The relationships between ground measurements and columnar values obtained by the sun radiometer during day time will help on the development of new algorithms to be applied by a new generation of radiometers intended to be used during the long Polar night - the moon radiometers.


© Ana Barroso

ELEMENTAL AND INDIVIDUAL PARTICLE ANALYSIS OF ATMOSPHERIC AEROSOLS FROM THE ARCTIC REGION

The 5th IPCC assessment report identifies deficits in understanding of atmospheric aerosol climate effects as one of the most significant sources of uncertainty in climate predictions. The measurement of aerosols in Polar regions has some peculiarities derived from obvious geographical considerations, that make it more difficult to accomplish than in other regions. Standard solar radiometry used to obtain columnar data is not applicable during the long Polar nights in which the Sun as light source is not available. Another question concerns the common thought that, in the Arctic there are no local sources of aerosols and that existing particles are transported from mid-latitudes. However, there are some local sources associated with, for instance, shipping and oil extraction, that although may be small when compared with other regions, they exist and are poorly quantified. The study of local sources and its quantification is one of the goals included on activities of the Atmosphere Working Group of the International Arctic Science Committee. Since 2002 the Group of Atmospheric Optics (GOA) is performing Arctic campaigns in cooperation with ALOMAR. During those years the PI was a PhD student and member of GOA, and the group activities were oriented only to columnar studies. Interest of the PI in the Arctic started in 2005, during her stay in ALOMAR, where she started performing *in situ* measurements.

Several works followed, the last included on the International Polar Year activities, under project POLARCAT (POLar Study using Aircraft, Remote sensing, surface measurements and modelling of Climate, chemistry, Aerosols and Transport) coordinated by NILU. This proposal is a continuation of POLARUBI project funded on the scope of PROPOLAR 2015-16 Call. The work shares the same goals as Strategic Aerosol Observation and Modeling Capacities for Northern and Polar Climate and Pollution described on NILU's Strategic Institute Initiatives.

POLARUBI 2017-18 aims to analyze *in situ* aerosols in a clean environment located north of the Arctic Circle. The main goal is the characterization of individual particles but this information is to be studied together with columnar values, air masses origins and *in situ* data from the nearest stations, with the purpose of determining possible local sources and long range sources of imported particles. This campaign also intends to provide an *in situ* support to another project, namely POLARMOON - Aerosols, Clouds and Water Vapor in Polar Regions: emphasis in nocturnal photometry (taking place in several Arctic and Antarctic regions including ALOMAR, PI: Victoria Cachorro).


© Ana Barroso

PROJECTS in ANTARCTICA

CEPH-BAS 2017

LONG-TERM PELAGIC FAUNA ANALYSES OF THE SOUTHERN OCEAN

José Xavier, Marine Environmental Sciences Centre (MARE), University of Coimbra, Portugal

José Xavier, José Abreu (MARE, University of Coimbra)

Research project developed in foreign institutions

PROPOLAR • SCAR AnT-ERA

British Antarctic Survey (BAS), Cambridge, United Kingdom

José Xavier

José Abreu

Pelagic invertebrates play a key role in the Antarctic marine ecosystem and might be affected by climate change. Squid are among the few Antarctic fisheries with potential to be exploited. However, our understanding of the role of pelagic organisms in the Antarctic marine ecosystem is surprisingly poor. CEPH-BAS 2017 is a novel multi-disciplinary and international project aiming to better understand the role of the squid within the Antarctic marine food web. The project will allow research work at the British Antarctic Survey (BAS, Cambridge, United Kingdom) to characterize the invertebrate fauna around South Georgia, through the diet of 6 top predators (2 species of penguins, 1 seal and 3 species of albatrosses) carried out within a single field season. After the characterization of the diets, stable isotopic analyses will allow to obtain information about their distribution, habitat, diet and trophic level. These data will be incorporated into ICED, SCAR AnT-ERA and SCAR EGBAMM.

© José Abreu

LONG-TERM PELAGIC FAUNA ANALYSES OF THE SOUTHERN OCEAN

CEPH-BAS 2017 is a multi-disciplinary and international project proposal aiming to better understand the role of pelagic organisms within the Antarctic marine ecosystem. The information obtained from these studies is essential for an ecosystem approach of the sustainable use of Southern Ocean (SO) resources, as emphasized by organizations that we are working with (Scientific Committee for Antarctic Research, SCAR), and within major international programs (SCAR Antarctic Thresholds - Ecosystem Resilience and Adaptation, AnTERA) and expert groups (SCAR expert group on Birds and Marine Mammals, EGBAMM), in which we are highly involved.

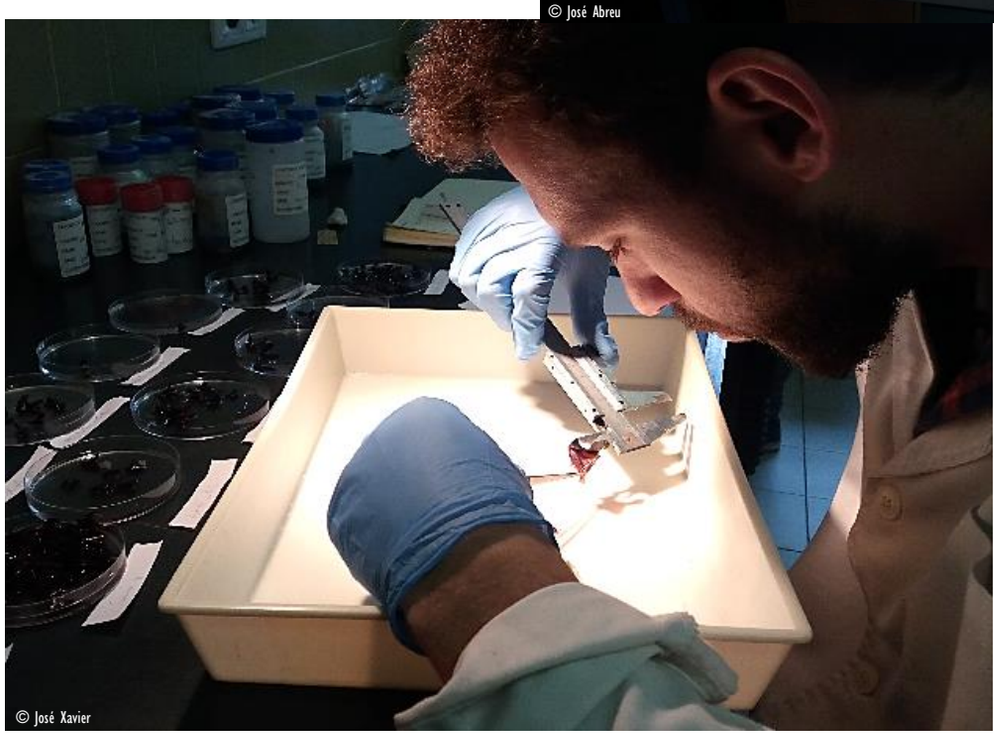
Pelagic squid (hereafter squid) are pelagic invertebrates with an important role in marine ecosystems. Squid are the link between phyto- and zooplankton and the higher trophic levels, and they have the potential to be exploited commercially. Our understanding of the function of the squid in the Antarctic ecosystem is surprisingly poor and needs to be urgently addressed as noted by SCAR Horizon Scan.

Within CEPH-BAS, we will participate in laboratory research trip to Cambridge, to the headquarters of the BAS, where is planned to analyze squid, among others. The samples collected will be used to study the distribution, habitat and trophic level of these organisms to understand their function in the pelagic food web.

The project has various advantages, and whose timing is ideal. Firstly, this is a long-term collaboration between Portugal, UK and France. Secondly, CEPH-BAS asks from PROPOLAR only travel support for two scientists to the UK, as BAS will provide all the logistics necessary to collect the samples during this year. Thirdly, this work will allow our Portuguese team to have a strong contribution to this field.

The scarcity of data and information about availability, habitat and trophic ecology of Antarctic squid have been made difficult. CEPH-BAS 2017 aims to characterize the cephalopod fauna around South Georgia, an ecological hotspot in the Atlantic sector of the Southern Ocean, obtaining a unique dataset to fit and improve the food web dynamics models being developed for this area and to test two hypotheses. Firstly, squid is important to the Southern Ocean pelagic ecosystem, by assessing it through the diet of key top predators in the region. And secondly, squid habitat and trophic levels change according to their size (and their maturity stage), as obtained by their predators (e.g. penguins are thought to feed on juvenile squid, Antarctic fur seals and smaller albatrosses on sub-adults and Patagonian toothfish and wandering albatrosses on adult squid) around South Georgia. The data collected under CEPH-BAS will be the basis for one master project and 2 other students.

© José Abreu



© José Xavier

CIRCLAR 2

MAPPING AND MONITORING SORTED STONE CIRCLE FIELDS WITH ULTRA-HIGH RESOLUTION IMAGERY IN MARITIME ANTARCTICA, PART 2

Pedro Pina, Centro de Recursos Naturais e Ambiente (CERENA), Instituto Superior Técnico, University of Lisbon, Portugal

Pedro Pina, Sandra Heleno (CERENA, IST, University of Lisbon)

Research project in Antarctica

PROPOLAR • CERENA

Protected area visited ASPA 171, Narebski Point, Antarctica

Barton Peninsula, King George Island, South Shetland Archipelago, Antarctica

Pedro Pina

Sandra Heleno

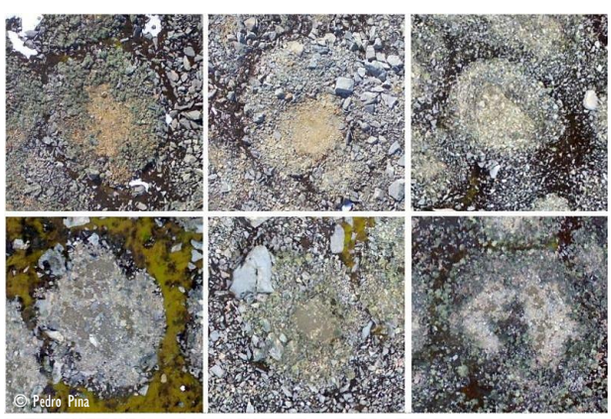
The main objective of CIRCLAR 2 is to improve the mapping and monitoring of areas densely occupied by sorted stone circles in Barton using UAVs. After CIRCLAR 1 (campaign developed in Fildes Peninsula, King George Island, in 2017), a relevant improvement is planned to acquire 2 types of complementary data: besides the ultra-resolution imagery obtained with a photographic camera on one UAV, the altimetry will be also acquired by LiDAR technology installed on other UAV. The image mosaics will be accompanied by DEMs obtained from direct measurements and not by DEMs obtained from stereo pairs of optical images. These higher details, to be processed with the segmentation and characterization algorithms whose design and development was initiated in CIRCLAR1, will certainly contribute to obtain a more precise result in a wider dimensional range of the clasts constituting the stone circles. The installation of field markers to monitor the temporal dynamics of these patterns will be also performed during the field campaign.

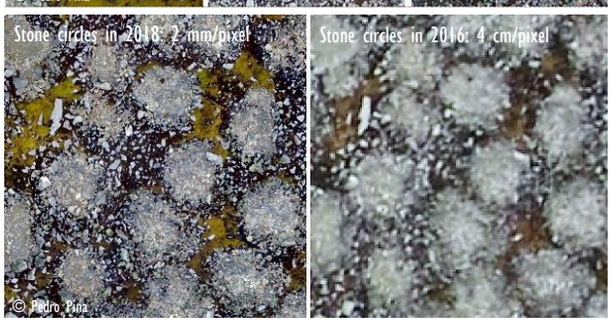
© Pedro Pina

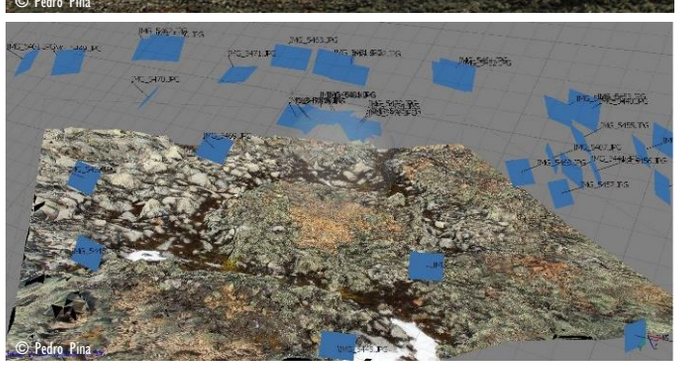
MAPPING AND MONITORING SORTED STONE CIRCLE FIELDS WITH ULTRA-HIGH RESOLUTION IMAGERY IN MARITIME ANTARCTICA, PART 2

Stone circles are a type of patterned ground formed in periglacial environments easily attracting the attention due to its remarkable circular geometry. They occur in clusters and are formed in frost-susceptible soils due to freeze-thaw cycles in a convection-like circulation of soil in the active layer of permafrost. Besides their evident geomorphic importance, the periodic cyclic burial and exhumation of material may play an important role in the soil carbon cycle which, in connection to permafrost conditions and its changes, may designate them as potential paleoclimatic indicators. The processes underlying their formation/evolution are well understood, through direct measurements on the field and by modelling procedures. Their geometric characteristics, as well the monitoring of its seasonal dynamics, are described with detail in the literature. The recent use of imagery with ultra-high resolution captured by UAVs is permitting covering relatively large extensions of sorted stone circles with images cm resolution, changing their traditional description based on very few individuals. These images are therefore permitting an extensive characterization with a detail and statistical significance not achieved before. Automated delineation methods started to be developed and applied, achieving already good results. Also, the characteristics of the UAV flights to perceive on the images the smaller details (namely, the individual clasts constituting the circles) are relatively well evaluated. The possibility of using LiDAR technology to obtain directly the 3rd dimension of these structures would be a major advancement for their complete description and monitoring. The verification of the quality of the improvement achieved, and up to each scale is possible to obtain reliable information, should naturally be tested on the field using ground reference markers or patterns.

CIRCLAR 2 intends to continue mapping and monitoring areas densely occupied by sorted stone circles in Maritime Antarctica using ultra-high resolution data captured by two types of sensors (camera and LiDAR) installed in UAVs. The mm optical imagery to be acquired together with the novel direct measurement of the altimetry by LiDAR technology will contribute to an improved geomorphic description and understanding of the associated dynamic processes of this type of patterned ground not achieved before. The sites selected for field surveys are located in Barton Peninsula (King George Island) where sorted stone circles are ubiquitous. Large mosaics and digital elevation models will be built with images and LiDAR data, respectively. These products will be automatically processed to delineate the contours of each individual circle, identify its clasts and compute granulometries, and make an extensive spatial analysis (spatial densities, neighborhood analysis, and relation with global topography).







ETeA II

ENSURING TEAMWORK EFFECTIVENESS ON ANTARCTICA II

Pedro Quinteiro, William James Center for Research (WJCR), Instituto Universitário (ISPA, Portugal)

Pedro Quinteiro, Walter J. Eppich (Northwestern University Feinberg School of Medicine, USA)

Research project in Antarctica

PROPOLAR

Protected area visited ASPA 125, Fildes Peninsula • ASPA 150, Ardley Island, Antarctica

King George Island • Ardley Island - South Shetland Archipelago, Antarctica

Pedro Quinteiro

Walter Eppich

This project's goal is to extend and validate the conceptual model of teamwork effectiveness, developed within project ETeA during PROPOLAR's 2016-2017 campaign. The results suggest that campaign stressors like station living conditions, teamwork dynamics such as contingency planning, and team member characteristics like Antarctica field experience are key to teamwork effectiveness in Antarctica Science Teams (AST). In this project we aim to quantitatively validate these findings, by means of a transcultural study in which participants will be the team members of the science teams from the multiple polar programs enrolled in the 2017-2018 campaign. Data will be collected through questionnaires and field observation. The combined outcomes of ETeA and ETeA II will drive future research on teamwork in Antarctica, and the development of planning and intervention policies focused in promoting teamwork in the Polar Regions.

© Pedro Quinteiro

ENSURING TEAMWORK EFFECTIVENESS ON ANTARCTICA II

Scientists agree that teamwork is key to ensure successful Antarctica campaigns because environment and isolation lead to challenges that regular teams never experience, and individuals cannot tackle alone. Ongoing research is unveiling the drivers of teamwork effectiveness (i.e. the inputs, processes, and outcomes of teamwork) in AST. Through a mix-methods approach, combined interview and diary data identify what factors drive effectiveness in Portuguese AST. Initial findings suggest that weather unpredictability and logistic setbacks are campaign stressors and major obstacles to AST's mission success. To deal with these challenges, AST rely on behaviors like pre-mission planning, negotiating with other teams and station personnel, and reflecting about mission development during campaign. These results are based on qualitative research that allow a broader exploration of the phenomenon, and need to be reinforced with a confirmatory quantitative approach to allow stronger prediction of effectiveness. The next step is a quantitative study where data from self-report questionnaires and behavior observation can confirm that the dimensions identified in ETeA are in fact important, and that predictions can be made about the role of these dimensions in the success of AST campaigns. Additionally, ETeA's results are based on the study of Portuguese teams only, which are not representative of the AST population. Culture specific psychological features such as values (e.g. collectivism vs. individualism) significantly influence how people think, behave, and feel in extreme environments.

Therefore it is key to explore these cultural based behavioral drivers in AST and validate our teamwork effectiveness model intercultural. Our findings will advance knowledge of how people from different cultures are able to work effectively in teams, and to set the basis for a common understanding of effective teamwork in Antarctica.

ETeA II is driven by two research questions: 1) how do campaign stressors (e.g., station living conditions), teamwork dynamics (e.g., adapting to equipment malfunctions), and team member characteristics (e.g., Antarctica field experience) influence teamwork effectiveness in ASP? and 2) are there any cultural differences in what drives teamwork effectiveness in ASP? These research questions justify ETeA II's main research goal (Goal 1), i.e., to extend and validate the conceptual model of teamwork effectiveness developed during PROPOLAR's 2016-2017 (ETeA) campaign [5]. Goal 1 contains two sub-goals: Sub-goal 1 is to develop a general survey of teamwork effectiveness for AST based on the results from ETeA; Sub-goal 2 is to identify communalities and differences across nationalities regarding what drives teamwork effectiveness in Antarctica. Achieving these goals will empower scientists and policy makers' decision making regarding human collaboration in Antarctica).

© Guilherme Jeremias

© Walter Eppich

HYDROTOMO

GEOELECTRICAL SURVEY TO STUDY PERMAFROST HYDROLOGY AND ITS POSSIBLE INFLUENCE IN ECOSYSTEM EVOLUTION IN SITES NEAR THE KOREAN ANTARCTIC STATION AND THE AQUIFER OF THE PERUVIAN ANTARCTIC STATION, KING GEORGE ISLAND, MARITIME ANTARCTICA

António Correia, Instituto de Ciências da Terra (ICT), University of Évora, Portugal

António Correia, Pedro Mendes (ICT, University of Évora)

Research project in Antarctica

PROPOLAR

King George Island, South Shetland Archipelago, Antarctica


António Correia


Pedro Mendes

On the scope of the HYDROTOMO project, new electrical resistivity tomographies (ERTs) should be done in the sites of the Korean Antarctic Station previously occupied in the campaign of 2016-2017. The main objective is to evaluate the lateral and vertical extension of the permafrost/active layer and try to correlate the results with permafrost hydrology and distribution of vegetation cover. Because of the difficulties in using ERTs in some of the sites, experiments with electromagnetic equipment will be also carried out with the idea of increasing the capabilities of geophysical methods to study permafrost in high electrical resistivity areas. A geophysical survey using ERTs in the area of the Peruvian Antarctic Station should be started with the objective of characterizing and delineating the aquifer near the station which is used to provide water to the station. The main long term objective is to create a 3D model of the aquifer to improve its exploration.


© António Correia

GEOELECTRICAL SURVEY TO STUDY PERMAFROST HYDROLOGY AND ITS POSSIBLE INFLUENCE IN ECOSYSTEM EVOLUTION IN SITES NEAR THE KOREAN ANTARCTIC STATION... KING GEORGE ISLAND, MARITIME ANTARCTICA

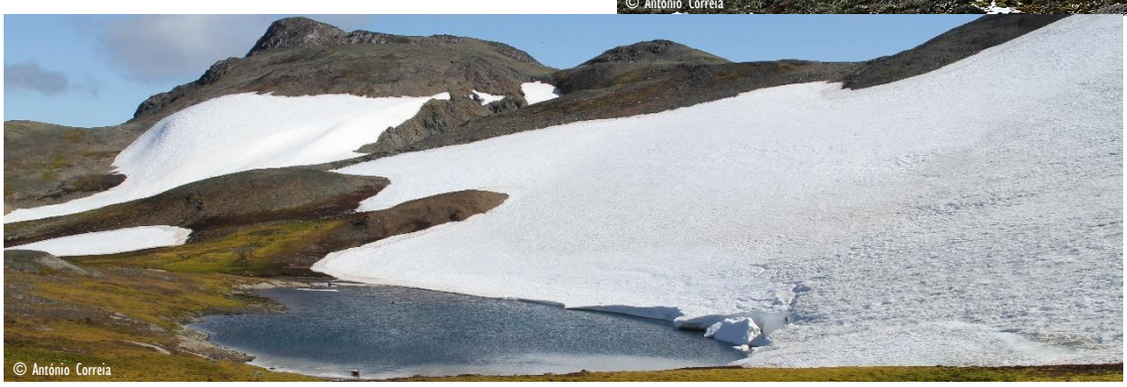
The proposed project is divided in two parts which result from the opportunity of using the stay in King George Island of the South Shetland Islands to perform two tasks in two different Antarctic Stations: the Korean Antarctic Station and the Peruvian Antarctic Station. In the Korean Antarctic Station the proposed work will be a continuation of the work done in the campaign of 2016-2017. Electrical resistivity tomographies will be carried out in three sites previously occupied with the objective of continuing covering the entire areas with lateral and vertical geoelectrical information so that a tentative three-dimensional geoelectrical model can be constructed to try to infer the shallow hydrology pattern. This might explain the distribution of the vegetation cover and, with the continuation of the work, the evolution of the local ecosystems. Even though the main idea is to start long term geophysical monitoring near the Korean Antarctic Station, the objectives of this new project are twofold: (i) to map permafrost and active layer and correlate their changes in time with long-term ecosystem response to climate change in several sites already occupied in 2017, (ii) to try to quantify moisture content of the active layer and wet permafrost by using different geophysical techniques. As a matter of fact, even though electrical resistivity tomographies have been very successful in delineating permafrost and active layer in other areas of the South Shetland Islands, in the three areas already occupied near the Korean Antarctic Station the high electrical resistivities of the ground have created great difficulties in carrying out electrical resistivity tomographies. To overcome those difficulties electromagnetic methods will also be carried out and compared with electrical resistivity tomographies done along the same profiles.

The project aims at (i) continuing the geoelectrical monitoring (using electrical resistivity tomography and electromagnetic methods) in three areas with patterned ground near the Korean Antarctic Station in Barton Peninsula, (ii) starting a geophysical survey using electrical resistivity tomography methodology to delineate the aquifer geoelectrical structure that provides water to the Peruvian Antarctic Station. For the two Antarctic stations the main objective is to understand and delineate the geoelectrical structure of the chosen areas, i.e., the ones already occupied near the Korean Antarctic Station in 2017, and the area of the aquifer that provides water to the Peruvian Antarctic Station.


© António Correia


© António Correia


© António Correia


© António Correia

LATA 2017

LOADING AND TECTONICS OF ANTARCTICA PENINSULA - 2017

Rui Fernandes, Space & Earth Geodetic Analysis Laboratory (SEGAL), University of Beira Interior (UBI), Portugal

Rui Fernandes, Bento Martins (UBI)

Research project in Antarctica

PROPOLAR • UBI

Protected area visited ASPA 134, Cierva Point and offshore islands, Danco Coast, Antarctic Peninsula

Cierva Point, Antarctic Peninsula, Antarctica


Rui Fernandes

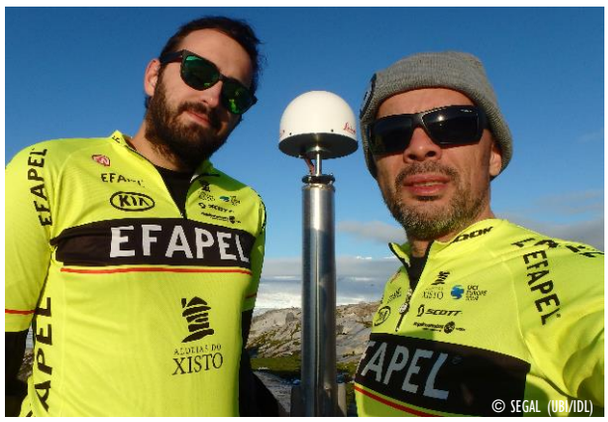

Bento Martins

The LATA - 2017 project is extending the initial goals of the project LATA approved in 2014. This project aims to: (i) verifying ocean tide models around the Antarctica Peninsula using GNSS/gravity derived ocean tide loading, refined with local tide gauge observations, (ii) compute the angular velocities of the Antarctica Peninsula tectonic block, (iii) study the consequences caused by human activity on the permafrost around Primavera base. The LATA project resulted in the installation of the GNSS station (including a weather station) on the Argentinian base Primavera in January 2016. We will install missing ancillary equipment to acquire the GNSS data whole year round. Additionally, we will carry out a tidal gravimetry and tide gauge campaign at this station. This will provide additional results to verify the ocean tide models. This study is performed in the framework of a Ph.D project that was initiated recently at SEGAL focused on the improvement of OTL corrections for tectonic studies using GNSS.


© SEGAL (UBI/IDL)

LOADING AND TECTONICS OF ANTARCTICA PENINSULA - 2017

The ocean tides around the Antarctic are still one of the least known around the world. The main reason for this is that most satellite altimetry satellites have orbits that do not come south enough to observe this region. In addition, there are few *in situ* tide gauges. Since the weight of the ocean tides deform the solid Earth, called ocean tide loading (OTL), the resulting variations in the Earth's gravity field provide information about the ocean tides. At the station, the differences between the predicted OTL using various ocean tide models observed with GNSS and gravity, the latter observed for two weeks, can reach uGal and millimeter level which is sufficient to verify the tide models in the area. Local tide gauge observations will further improve the results. A reduction in the ocean tide models will also benefit the GRACE satellite mission that is used to observe the ice mass changes over the Antarctic due to climate change. The Antarctica Peninsula has been considered to be located on the Antarctica tectonic plate, which is divided in two major geological provinces with the Antarctica Peninsula being one of the major terranes of West Antarctica. In its extreme northern tip, the Antarctica Peninsula forms part of a complex tectonic system resulting of the convergence between two major tectonic plates: Antarctica and South America that also created several minor plates/blocks, namely the Scotia plate and the South Shetland block. This last block has been created by active subduction with back-arc expansion. Previous works based on GNSS observations showed the existence of some level of deformation between West Antarctica and the East Antarctica Craton. Furthermore, there are significant differences (up to 5mm/yr) between the predictions when different angular velocity models are used.



© SEGAL (UBI/IDL)

The LATA 2017 project focuses on the use of geodetic techniques to study geophysical and anthropogenic signals. The installed GNSS station and the proposed gravimetric/tide gauge campaign at Primavera base will permit us to investigate: (i) the ocean tides in the Bellingshausen and Weddell seas, (ii) the angular velocities of the Antarctica Peninsula tectonic block, (iii) the consequences caused by human activity on the permafrost around Primavera base, (iv) the improvement on the GNSS solutions of better OTL corrections for tectonic studies (to be conducted in the framework of a Ph.D. programe). In addition, the installed GNSS will also contribute on a multi-disciplinary level by supporting other studies in the region where accurate geo-referencing is required.


© SEGAL (UBI/IDL)


© SEGAL (UBI/IDL)

PERMANTAR 2017-18

PERMAFROST AND CLIMATE CHANGE IN WESTERN ANTARCTIC PENINSULA

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Sara Ramos Marín and Gabriel Goyanes (IGOT), Miguel Ramos Saínz (University of Alcalá de Henares, Spain)

Research project in Antarctica

PROPOLAR • CEG-IGOT • Project PERMASNOW (Spain)

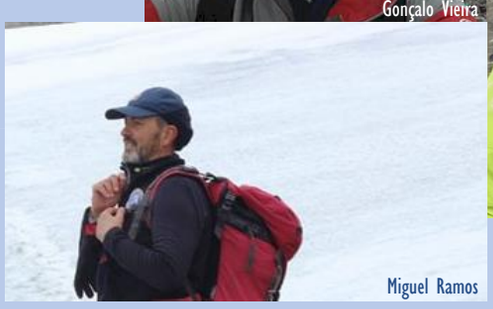
Protected area visited ASPA 134, Cierva Cove and Offshore island, Danco Coast, Antarctica

Livingston Island (South Shetland Archipelago) • Cierva Point (Antarctic Peninsula), Antarctica

Gonçalo Vieira

Sara Ramos Marin

Gabriel Goyanes



Miguel Ramos

The Antarctic Peninsula is one of Earth's regions with strongest air temperature increase since the 1950's. However, the signal is more complex than previously accounted and recent studies report a cooling in the north of the Antarctic Peninsula since 2000. The complexity of the reaction of the region to climate change is poorly understood and in order to evaluate the consequences in the terrestrial environments, dominated by the presence of permafrost, monitoring and modelling are essential. This project aims at increasing the understanding of the changes in the ice-free terrestrial environments of Western Antarctic Peninsula (WAP) and their linkages to permafrost. The primarily goal is maintaining and upgrading the permafrost observatories of the Global Terrestrial Network for Permafrost (GTN-P) across c. 450 km in the WAP, from Palmer to Dundee Island. The activities will be complemented with the monitoring and mapping of the Hurd rock glacier in Livingston Island.

© Miguel Ramos

PERMAFROST AND CLIMATE CHANGE IN WESTERN ANTARCTIC PENINSULA

The Western Antarctic Peninsula (WAP) has been one of Earth's regions showing a strongest warming trend up to 1999/00 with an increase of more than 2.5 ºC in the MAAT since the 1950's. However, recent studies have shown that since 2000 a cooling trend prevailed. Several studies have been taking place on periglacial processes and their relation to permafrost in the WAP and the last overview of the thermal state shows that permafrost is close to 0ºC in the region and as far south as the Palmer archipelago permafrost is absent near sea-level. Recent studies showed that despite no increase in MAAT in Deception Island, there was a thinning of the active layer associated with increased snow cover. In the last summer season, the data we have collected from Palmer archipelago showed again a warming, which was also visible in a general reduction in summer snow cover across the WAP. It is therefore clear that the ground is very sensitive to minor climate changes, which will show impacts on the dynamics of the terrestrial ecosystems. The active layer depth is very variable interannually and largely dependent on snow cover, which is a key variable needing further research. It has been shown that SAR imagery can be used for mapping snow cover at a regional scale and can also be inferred from bioindicators using remote sensing. The last decade of research in the WAP shows that the region is far from well-understood and that impacts of climate change are more complex than expected. These facts add up to increase interest in the region and support the continuation of our investigations, which are based on long-term observatories that we have been installing and maintaining since 2000. It is worth mentioning that interdisciplinary linkage between field observations, remote sensing and modelling in a key area for climate change, resulted in PERMANTAR observatories being integrated in the ESA GLOBPERMAFROST, as an outcome of this initiative.


© Miroslav Cvqtkov

This proposal builds up on the long-term strategy of PERMANTAR for monitoring and modelling Antarctic Peninsula permafrost environments and aims at continuing research by enabling field access to scientists. Its acceptance is essential for the maintainance of the data-series of GTN-P observatories. S. Ramos will develop her Masters thesis about the permafrost and active layer regime in Cierva Cove, the first area in the Antarctic Peninsula itself with permafrost borehole down to 15 m. PERMANTAR 2017-18 data sets contribute to ESA DUE GlobPermafrost and to GTN-P. PERMANTAR targets at several SCAR key science priorities, namely (39) What are and have been the rates of geomorphic change in different Antarctic regions, and what are the ages of preserved landscapes? and (42) How will permafrost, the active layer and water availability in Antarctic soils and marine sediments change in a warming climate, and what are the effects on ecosystems and biogeochemical cycles?


© Sara Ramos Marin


© Sara Ramos Marin


© Sara Ramos Marin

ReACT

RISK ASSESSMENT IN FILDES PENINSULA: IMPROVING KNOWLEDGE TOWARDS ENVIRONMENTAL PROTECTION ACTIONS IN THE ANTARCTICA

Joana Pereira, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal

Joana Pereira, Guilherme Jeremias (University of Aveiro), Ruth Pereira (CIIMAR, University of Oporto, Portugal)

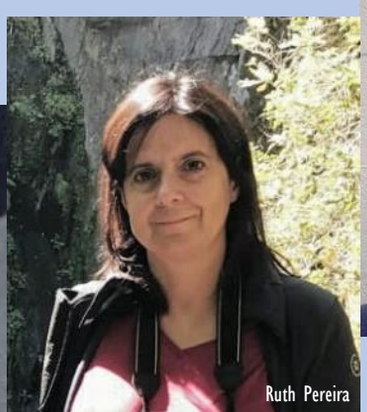
Research project in Antarctica

PROPOLAR

Protected area visited ASPA 150, Ardley Island, Antarctica

Ardley Island • King George Island • Nelson Island - South Shetland Archipelago, Antarctica


Joana Pereira


Ruth Pereira


Guilherme Jeremias

The Antarctica is often viewed as an untouched area of the planet but human-driven pollution of its ecosystems has already been evidenced. However, the integration of chemical assessment (environmental burden), ecological data (effects in the biota) and ecotoxicological evidences (cause-effect relationships) is still scarce. This project intends to apply a structured Environmental Risk Assessment framework collecting and integrating data from these three lines of evidence to the Fildes Peninsula, which has been highlighted as a hotspot of trace-element (TE) contamination. Soil, freshwater and coastal sediments will be assessed for their TE burden, for biodiversity and functions they can support, and for their toxic effects in indicator species. An effective contribution to environmental protection/management actions in the Antarctica is envisioned through the final delivery of GIS-based risk maps, which will allow a robust support to further decision making in this context.


© Guilherme Jeremias

RISK ASSESSMENT IN FILDES PENINSULA: IMPROVING KNOWLEDGE TOWARDS ENVIRONMENTAL PROTECTION ACTIONS IN THE ANTARCTICA

Antarctica is generally considered to be an untouched area but scientific evidences show that its ecosystems have been subject to increased human pressure (driven by the growth of research, touristic and transportation activities). Organic (e.g. PAH, PCB) and trace-element (TE) contamination has been evidenced in several environmental matrices throughout the Antarctica at non-geogenic levels potentially causing ecosystem disturbance, with King George Island and Fildes Peninsula being hotspots in this context; TE contamination is relevant per se and also because specific TE can be reliable indicators of pollution by other compounds (oil-derived organics) in the Antarctica. Whilst chemical quantification can picture the contamination load of a given area, the biological effects of such a load are largely dependent on the environmental context and require site-specific assessment. In fact, the estimation of the environmental risks posed by potentially hazardous contaminants requires integration of different lines of evidence (LoE), typically the chemical, the ecological and the ecotoxicological LoE (Triad concept), within a structured Environmental Risk Assessment (ERA) framework integrating site specific information through different tiers aimed at reducing uncertainty in risk estimation. ERA is accepted worldwide as a reliable tool to better frame decision making regarding the most adequate management towards environmental protection and/or remediation strategies. Still, apart from very recent preliminary approach to the Fildes Peninsula by the research team, no other ERA attempts have been made in the Antarctica. The present proposal is assumedly a follow-up, capitalising on the recognised need for a better support of the major challenge of the Protocol on Environmental Protection to the Antarctic Treaty, i.e. the planning of human activities in order to minimize impacts upon the Antarctic environment and ecosystem.

An effective contribution to environmental protection and management actions in the Antarctica is envisioned. Thus, the overarching aim of this project is to carry out an ERA (focused on tiers 1 and 2) in Fildes Peninsula, by collecting data on the chemical, ecotoxicological and ecological LoE considering soils, freshwater and coastal ecosystems, towards the delivery of GIS-based risk maps allowing a robust view on the actual environmental protection/remediation needs. Related specific aims are to: (i) get a holistic overview on the interaction between soils/aquatic resources in terms TE mobility/bioavailability, better identifying the most concerning areas/scenarios for contamination spread and potential trophic transference; (ii) gain an insight on ecosystems (soil, freshwater bodies and coastal sediments) biodiversity and functioning; (iii) link TE pollution with noxious effects in bioindicators (individual and sub-individual levels) through ecotoxicological assessment.


© Pedro Quinteiro


© Pedro Quinteiro


© Guilherme Jeremias


© Guilherme Jeremias

LIST OF OTHER PROJECTS SUPPORTED BY PROPOLAR

LIST OF PROJECTS SUPPORTED BY PROPOLAR

The list of projects supported by PROPOLAR, since 2011, is herein presented:

2011-2012

COOPANTAR - DYNAMICS OF INTERNATIONAL COOPERATION IN ANTARTICA

Carlos Manuel Mendes, Academia Militar, Lisboa, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

CONTANTARC - TRACE ELEMENT FATE, TRANSPORT AND SPECIATION IN ENVIRONMENTAL COMPARTMENTS IN DECEPTION ISLAND (ANTARCTICA)

João Canário, Instituto de Investigação das Pescas e do Mar (IPIMAR), Instituto Nacional de Recursos Biológicos (INRB), Lisboa, Portugal

Research project in Antarctica

Deception Island, South Shetland Archipelago, Antarctica

FISHWARM - ADAPTATIVE RESPONSES OF FISH TO ENVIRONMENTAL CHANGE

Adelino Canário, Centre of Marine Sciences (CCMAR), University of Algarve, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HOLOANTAR - LATE HOLOCENE EVOLUTION OF THE SOUTH SHETLANDS PERMAFROST ENVIRONMENT - MARITIME ANTARCTIC

Marc Oliva, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

PENGUIN - INTER-SPECIFIC DIETARY COMPETITION BETWEEN THREE PENGUIN SPECIES: DO THEY COMPETE FOR THE SAME PREY?

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal

Research project in Antarctica

Livingston Island, South Shetland Archipelago, Antarctica

PERMANTAR-2 - PERMAFROST AND CLIMATE CHANGE IN THE MARITIME ANTARCTIC

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Deception Island • King George Island • Livingston Island (South Shetland Archipelago) • Cierva Point (Antarctic Peninsula), Antarctica

SNOWCHANGE - SNOWPATCH DYNAMICS AND THE CHANGING PERMAFROST ENVIRONMENT

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

2012-2013

ANATOCU - ANTHROPOLOGY OF ANTARCTIC TOURISM CULTURE: PROPOSAL FOR A PRELIMINARY STUDY

David Picard, Centro em Rede de Investigação em Antropologia (CRIA), Faculdade de Ciências Sociais e Humanas (FCSH), NOVA University of Lisbon, Portugal

Research project in Antarctica

Ushuaia, Argentina

CEPH 2013 - CEPHALOPOD FAUNA OF THE SOUTHERN OCEAN

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal • British Antarctic Survey (UK)

Research project developed in foreign institutions

Wellington, New Zealand

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2012-2013 (continuation)

CONTANTARC 2 - TRACE ELEMENTS SPECIATION, PARTITION AND TRANSPORT IN AQUATIC SYSTEMS OF KING GEORGE ISLAND (ANTARCTICA)

João Canário, Instituto Português do Mar e da Atmosfera (IPMA) Lisboa, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

FISHWARM - PHYSIOLOGICAL AND MOLECULAR PLASTICITY TO THERMAL AND OSMOREGULATORY CHALLENGE IN ANTARCTIC FISHES

Adelino Canário, Centre of Marine Sciences (CCMAR), University of Algarve, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HISURF - VERY HIGH RESOLUTION IMAGING FOR DETAILED SURFACE MAPPING IN ICE-FREE AREAS OF MARITIME ANTARCTICA

Pedro Pina, Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HOLOANTAR - HOLOCENE ENVIRONMENTAL CHANGE IN THE MARITIME ANTARCTIC. INTERACTIONS BETWEEN PERMAFROST AND THE LACUSTRINE ENVIRONMENT

Marc Oliva, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Livingston Island, South Shetland Archipelago, Antarctica

MATAGRO - MONITORING OF ATMOSPHERIC TRACERS IN ANTARCTICA WITH GROUND-BASED OBSERVATIONS

Daniele Bortoli, Geophysics Centre of Évora (CGE), University of Évora, Portugal

Research project in Antarctica

Terra Nova Bay, Antarctica

NITROEXTREM - NITROGEN CYCLE IN EXTREME ANTARCTIC TERRESTRIAL ENVIRONMENTS: PROCESSES, COMMUNITIES AND ENVIRONMENTAL CONSTRAINTS

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal

Research project in Antarctica

McMurdo Dry Valleys, Victoria Land, Antarctica

PERMACHANGE - PERMAFROST MONITORING AND MAPPING IN THE SOUTH SHETLANDS

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Deception Island • Livingston Island (South Shetland Archipelago), Antarctica

2013-2014

ADAPT - ARCTIC DEVELOPMENT AND ADAPTATION TO PERMAFROST IN TRANSITION - PORTUGUESE BRANCH

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal

Research project in the Arctic

Kuujjuarapik, Quebec, Canada

CEPH 2013 - CEPHALOPOD FAUNA OF THE SOUTHERN OCEAN

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal • British Antarctic Survey (UK)

Research project developed in foreign institutions

Wellington, New Zealand

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2013-2014 (continuation)

CONTANTARC 3 - CONTAMINANT (BIO)AVAILABILITY IN SOILS AND SEDIMENTS OF FILDES BAY (KING GEORGE ISLAND, ANTÁRCTIDA)

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HISURF 2 - VERY HIGH RESOLUTION IMAGING FOR DETAILED SURFACE MAPPING IN ICE-FREE AREAS OF MARITIME ANTARCTICA - PART 2

Pedro Pina, Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HOLOANTAR - HOLOCENE ENVIRONMENTAL CHANGE IN THE MARITIME ANTARCTIC. INTERACTIONS BETWEEN PERMAFROST AND THE LACUSTRINE ENVIRONMENT

Marc Oliva, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Livingston Island, South Shetland Archipelago, Antarctica

MATAGRO - MONITORING OF ATMOSPHERIC TRACERS IN ANTARCTICA WITH GROUND-BASED OBSERVATIONS

Daniele Bortoli, Geophysics Centre of Évora (CGE), University of Évora, Portugal

Research project in Antarctica

Terra Nova Bay, Antarctica

NITROEXTREM - NITROGEN CYCLE IN EXTREME ANTARCTIC TERRESTRIAL ENVIRONMENTS: PROCESSES, COMMUNITIES AND ENVIRONMENTAL CONSTRAINTS

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal

Research project developed in foreign institutions

Waikato University, Hamilton, New Zealand

PERMANTAR-3 - PERMAFROST AND CLIMATE CHANGE IN THE ANTARCTIC PENINSULA

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Deception Island • Livingston Island (South Shetland Archipelago), Antarctica

2014-2015

ADAPT 2 - ARCTIC DEVELOPMENT AND ADAPTATION TO PERMAFROST IN TRANSITION - PORTUGUESE BRANCH

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal

Research project in the Arctic

Kuujjuarapik, Quebec, Canada

CEPH 2014 - CEPHALOPOD FAUNA OF THE SOUTHERN OCEAN

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal • British Antarctic Survey (UK)

Research project developed in foreign institutions

Alfred Wegener Institute (AWI), Bremen, and University of Hamburg, Germany

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2014-2015 (continuation)

CONTANTARC 4 - (BIO)AVAILABILITY OF MERCURY AND METHYLMERCURY IN A NATURAL CONTAMINATED ECOSYSTEM (DECEPTION ISLAND, ANTARCTICA)

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

Deception Island, South Shetland Archipelago, Antarctica

COSMOANTAR - HOLOCENE DEGLACIATION OF ICE-FREE AREAS IN THE SOUTH SHETLAND ISLANDS

Marc Oliva, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Livingston Island • King George Island (South Shetland Archipelago), Antarctica

EAIS-MARGINS - VULNERABILITY OF EAST ANTARCTIC ICE SHEET MARGINS

Caroline Lavoie, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal

Research project in Antarctica

Eastern Antarctic continental shelf, Antarctica

GEOPERM - INTEGRATED GEOLOGICAL, GEOCHEMICAL AND PERMAFROST STUDIES IN FILDES PENINSULA, KING GEORGE ISLAND, ANTARCTICA

Pedro Ferreira, Laboratório Nacional de Energia e Geologia (LNEG), Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

HISURF 3 - VERY HIGH RESOLUTION IMAGING FOR DETAILED SURFACE MAPPING IN ICE-FREE AREAS OF MARITIME ANTARCTICA - PART 3

Pedro Pina, Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

MATAGRO - MONITORING OF ATMOSPHERIC TRACERS IN ANTARCTICA WITH GROUND-BASED OBSERVATIONS

Daniele Bortoli, Geophysics Centre of Évora (CGE), University of Évora, Portugal

Research project in Antarctica

Terra Nova Bay, Antarctica

NITROEXTREM 3 - NITROGEN CYCLE IN EXTREME ANTARCTIC TERRESTRIAL ENVIRONMENTS: PROCESSES, COMMUNITIES AND ENVIRONMENTAL CONSTRAINTS

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal

Research project developed in foreign institutions

Waikato University, Hamilton, New Zealand

PERMANTAR-3 - PERMAFROST AND CLIMATE CHANGE IN THE ANTARCTIC PENINSULA

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Deception Island • Livingston Island (South Shetland Archipelago) • Doumer Island (Palmer Archipelago), Antarctica

POLAR LODGE - A SUSTAINABLE MODULAR BUILDING FOR RESEARCH DEVELOPMENT IN THE ANTARCTIC

Manuel Guedes, Instituto Superior Técnico (IST), University of Lisbon, Portugal

Research project in Antarctica

South Shetland Archipelago • Palmer Archipelago • Antarctic Peninsula, Antarctica

SICANTAR - SIC IN ANTARCTICA WITH THE PORTUGUESE RESEARCHERS

Carla Castelo and Filipe Ferreira, SIC - Sociedade Independente de Comunicação (Portuguese television network and media company), Lisbon, Portugal

Television and media project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2015-2016

AMS - UNRAVELLING THE STRENGTH OF CARRY-OVER EFFECTS IN A ARTIC MIGRATORY SHOREBIRD

Pedro Miguel Mendes Araújo, Marine Environmental Sciences Centre (MARE), University of Coimbra, Portugal
Research project in the Arctic
Iceland, Reykjavik Iceland South Iceland Research Centre, Iceland University

ANTUAV - DETAILED SURFACE MAPPING OF THE ICE-FREE AREAS OF MARITIME ANTARCTICA USING UAVs

Lourenço Bandeira, Centro de Recursos Naturais e Ambiente (CERENA), Instituto Superior Técnico, University of Lisbon, Portugal
Research project in Antarctica
Livingston Island, South Shetland Archipelago, Antarctica

FISHWARM III - PHYSIOLOGICAL AND MOLECULAR PLASTICITY TO THERMAL AND OSMOREGULATORY CHALLENGE IN ANTARCTIC FISHES

Adelino Canário, Centre of Marine Sciences (CCMAR), University of Algarve, Portugal
Research project in Antarctica
King George Island, South Shetland Archipelago, Antarctica

GEOPERM II - INTEGRATED GEOLOGICAL, GEOCHEMICAL AND PERMAFROST STUDIES IN FILDES AND BARTON PENINSULAS, KING GEORGE ISLAND, ANTARCTICA

Pedro Ferreira, Laboratório Nacional de Energia e Geologia (LNEG), Lisbon, Portugal
Research project in Antarctica
King George Island, South Shetland Archipelago, Antarctica

GEOWHIMBREL - EFFECTS OF LONG-DISTANCE MIGRATION ON INDIVIDUAL FITNESS

José Alves, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal
Research project in the Arctic
Iceland, Reykjavik Iceland South Iceland Research Centre, Iceland University

LATA - LOADINGS AND TECTONICS OF ANTARCTICA

Rui Fernandes, Space & Earth Geodetic Analysis Laboratory (SEGAL), University of Beira Interior (UBI), Portugal
Research project in Antarctica
Cierva Point, Antarctic Peninsula, Antarctica

MERCANTAR - MERCURY METHYLATION AND DEMETHYLATION RATES IN DECEPTION ISLAND WATERS IMPACTED BY VOLCANIC-MERCURY

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal
Research project in Antarctica
Deception Island, South Shetland Archipelago, Antarctica

PELAGIC - CEPHALOPOD FAUNA OF THE SOUTHERN OCEAN

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal • British Antarctic Survey (UK)
Research project in Antarctica
South Orkney Islands, Southern Ocean

PERMACHEM-WINTER - BIOGEOCHEMISTRY OF CARBON, SULPHUR AND CONTAMINANTS IN THERMOKARST LAKES UNDER WINTER CONDITIONS

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal
Research project in the Arctic
Kuujjuarapik, Quebec, Canada

PERMANTAR 2015-16 - PERMAFROST AND CLIMATE CHANGE IN THE ANTARCTIC PENINSULA 2015-16

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal
Research project in Antarctica
Deception Island • King George Island (South Shetland Archipelago) • Doumer Island (Palmer Archipelago), Antarctica

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2015-2016 (continuation)

POLAR LODGE - A SUSTAINABLE MODULAR BUILDING FOR RESEARCH DEVELOPMENT IN THE ANTARCTIC

Manuel Guedes, Instituto Superior Técnico (IST), University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

POLARUBI - INDIVIDUAL PARTICLE ANALYSIS OF ATMOSPHERIC AEROSOLS AT A REMOTE SITE, IN THE NORTH OF THE ARCTIC CIRCLE

Sandra Mogo, University of Beira Interior (UBI), Portugal

Research project in the Arctic

Norway, Arctic Lidar Observatory for Middle Atmosphere Research (ALOMAR), Andøya Space Center (ASC)

SHRUBIFLY - REMOTE SENSING ANALYSIS OF TERRAIN AND VEGETATION CHANGES IN THAW LAKE CATCHMENTS (WHAPMAGOOSTUI-KUUJJUARAPIK)

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in the Arctic

Whapmagoostui - Kuujjuarapik, Hudson Bay, Quebec, Canada

ZOOPWARM - ZOOPLANKTON IN A WARMING ARCTIC OCEAN: INTEGRATING TRANSCRIPTIONAL AND PHYSIOLOGICAL RESPONSES TO THERMAL STRESS

Ana Ramos, Centre of Marine Sciences (CCMAR), University of Algarve, Portugal

Research project in the Arctic

Norwegian Sea (Norway), Arctic Ocean, Arctic

2016-2017

ANTIMUNE - EVOLUTION AND CONSTRAINSTS OF IMMUNE RESPONSE IN NOTOTHENIOID FISHES

Adelino Canário, Centre of Marine Sciences (CCMAR), University of Algarve, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

ARCTISED - DEVELOPMENT OF REMEDIATION STRATEGIES FOR OIL CONTAMINATED ARCTIC SOIL

Paula Guedes , Faculdade de Ciências e Tecnologia (FCT), NOVA University of Lisbon (UNL), Portugal

Research project developed in foreign institutions

University of Tromsø and Akvaplan-niva, Norway

CEPH 2017 - CEPHALOPOD COMPONENT OF DIET OF TOP PREDATORS IN THE SOUTHERN OCEAN

José Xavier, Instituto do Mar (IMAR), University of Coimbra, Portugal • British Antarctic Survey (UK)

Research project developed in foreign institutions

National Institute of Water and Atmospheric Research (NIWA), New Zealand

CIRCLAR - MAPPING AND MONITORING SORTED STONE CIRCLE FIELDS WITH ULTRA-HIGH RESOLUTION IMAGERY IN MARITIME ANTARCTICA

Pedro Pina, Centro de Recursos Naturais e Ambiente (CERENA), Instituto Superior Técnico, University of Lisbon, Portugal

Research project in Antarctica

King George Island, South Shetland Archipelago, Antarctica

CRONOBYERS - HOLOCENE DEGLACIATION OF ICE-FREE AREAS IN LIVINGSTON ISLAND (SOUTH SHETLAND ISLANDS, ANTARCTICA)

Marc Oliva, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal

Research project in Antarctica

Livingston Island, South Shetland Archipelago, Antarctica

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2016-2017 (continuation)

EXPAR - EXTREME PRECIPITATION EVENTS IN ANTARCTICA: INVESTIGATING THE ROLE OF ATMOSPHERIC RIVERS

Irina Gorodetskaya, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal
Research project developed in foreign institutions
Institute for Snow and Avalanche Research (SLF), Davos, Switzerland

GEOPERM III - INTEGRATED GEOLOGICAL, GEOCHEMICAL AND PERMAFROST STUDIES IN FILDES AND BARTON PENINSULAS, KING GEORGE ISLAND, ANTARCTICA

Pedro Ferreira, Laboratório Nacional de Energia e Geologia (LNEG), Lisbon, Portugal
Research project in Antarctica
King George Island, South Shetland Archipelago, Antarctica

GEOWHIMBREL II - EFFECTS OF LONG-DISTANCE MIGRATION ON INDIVIDUAL FITNESS

José Alves, Centro de Estudos do Ambiente e do Mar (CESAM), University of Aveiro, Portugal
Research project in the Arctic
Iceland, Reykjavik Iceland South Iceland Research Centre, Iceland University • Ireland

Hg-PLANKTARCTIC - UNRAVELLING INTERACTIONS BETWEEN PHYTO- AND ZOOPLANKTON AND MERCURY CYCLING IN DECEPTION ISLAND WATERS IMPACTED BY VOLCANIC-MERCURY

Carla Gameiro, Centro de Ciências do Mar e do Ambiente (MARE), University of Lisbon, Portugal
Research project in Antarctica
Deception Island, South Shetland Archipelago, Antarctica

NITROEXTREM 2016-17 - NITROGEN CYCLE IN EXTREME ANTARCTIC TERRESTRIAL ENVIRONMENTS: A CASE STUDY OF CAPE ADARE PENGUIN COLONY

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal
Research project developed in foreign institutions
Waikato University, Hamilton, New Zealand

NITROnice - BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

Catarina Magalhães, Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR), University of Oporto, Portugal
Research project in the Arctic
LongYearByen, Svalbard Archipelago, Norway

PERMACHEM II - BIOGEOCHEMISTRY OF CARBON, SULPHUR AND CONTAMINANTS IN THERMOKARST LAKES UNDER WINTER CONDITIONS

João Canário, Centro de Química Estrutural (CQE), Instituto Superior Técnico, University of Lisbon, Portugal
Research project in the Arctic
Umiujaq, Quebec, Canada

PERMANTAR 2016-17 - PERMAFROST AND CLIMATE CHANGE IN WESTERN ANTARCTIC PENINSULA

Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal
Research project in Antarctica
Livingston Island, South Shetland Archipelago • Amsler Island, Palmer Archipelago • Cierva Cove, Antarctic Peninsula, Antarctica

PERMATOMO - GEOELECTRICAL STUDY OF PERMAFROST EVOLUTION IN THE CALM AND PAPAGAL SITES NEAR THE BULGARIAN ANTARCTIC STATION (LIVINGSTON ISLAND) AND NEAR THE KOREAN ANTARCTIC STATION (KING GEORGE ISLAND) ANTARCTICA

António Correia, Instituto de Ciências da Terra (ICT), University of Évora, Portugal
Research project in Antarctica
King George Island • Livingston Island (South Shetland Archipelago), Antarctica

LIST OF PROJECTS SUPPORTED BY PROPOLAR

2016-2017 (continuation)

POLARUBI 2016-17 - INDIVIDUAL PARTICLE ANALYSIS OF ATMOSPHERIC AEROSOLS AT THE NORTH OF THE ARCTIC CIRCLE


Sandra Mogo, University of Beira Interior (UBI), Portugal


Research project in the Arctic


Norway, Arctic Lidar Observatory for Middle Atmosphere Research (ALOMAR), Andøya Space Center (ASC)

SHRUBIFLY - REMOTE SENSING ANALYSIS OF TERRAIN AND VEGETATION CHANGES IN THAW LAKE CATCHMENTS (WHAPMAGOOSTUI-KUUJJUARAPIK)


Gonçalo Vieira, Centro de Estudos Geográficos, Instituto de Geografia e Ordenamento do Território (IGOT), University of Lisbon, Portugal


Research project in the Arctic


Whapmagoostui - Kuujjuarapik, Hudson Bay, Quebec, Canada

FUNDING FOR PARTICIPATION IN CONFERENCES

PROJECTS 2017-18

FUNDING FOR PARTICIPATION IN SCIENTIFIC CONFERENCES

The annual Call for Polar Research Projects 2017-18 provided funding for the young researcher in each project, to participate in scientific conferences outside Portugal. The young researcher had to be the first author of the oral or poster communication. Some projects applied for and received this additional funding.

PROJECTS BENEFITING FROM FUNDING FOR PARTICIPATION IN SCIENTIFIC CONFERENCES

CEPH-BAS 2017 - LONG-TERM PELAGIC FAUNA ANALYSES OF THE SOUTHERN OCEAN

Young researcher: José Abreu • SCAR/IASC Open Science Conference 2018, Davos, Swizerland

GEOWHIMBREL III - EFFECTS OF LONG-DISTANCE MIGRATION ON INDIVIDUAL FITNESS

Young researcher: Camilo Carneiro • Internacional Wader Study Group 2018, Workum, The Netherlands

NITROnice II - BIOGEOCHEMISTRY OF NITROGEN IN THE ARCTIC OCEAN: PROCESSES AND COMMUNITIES

Young researcher: António Sousa • SCAR/IASC Open Science Conference 2018, Davos, Swizerland

PERMANTAR 2017-18 - PERMAFROST AND CLIMATE CHANGE IN WESTERN ANTARCTIC PENINSULA

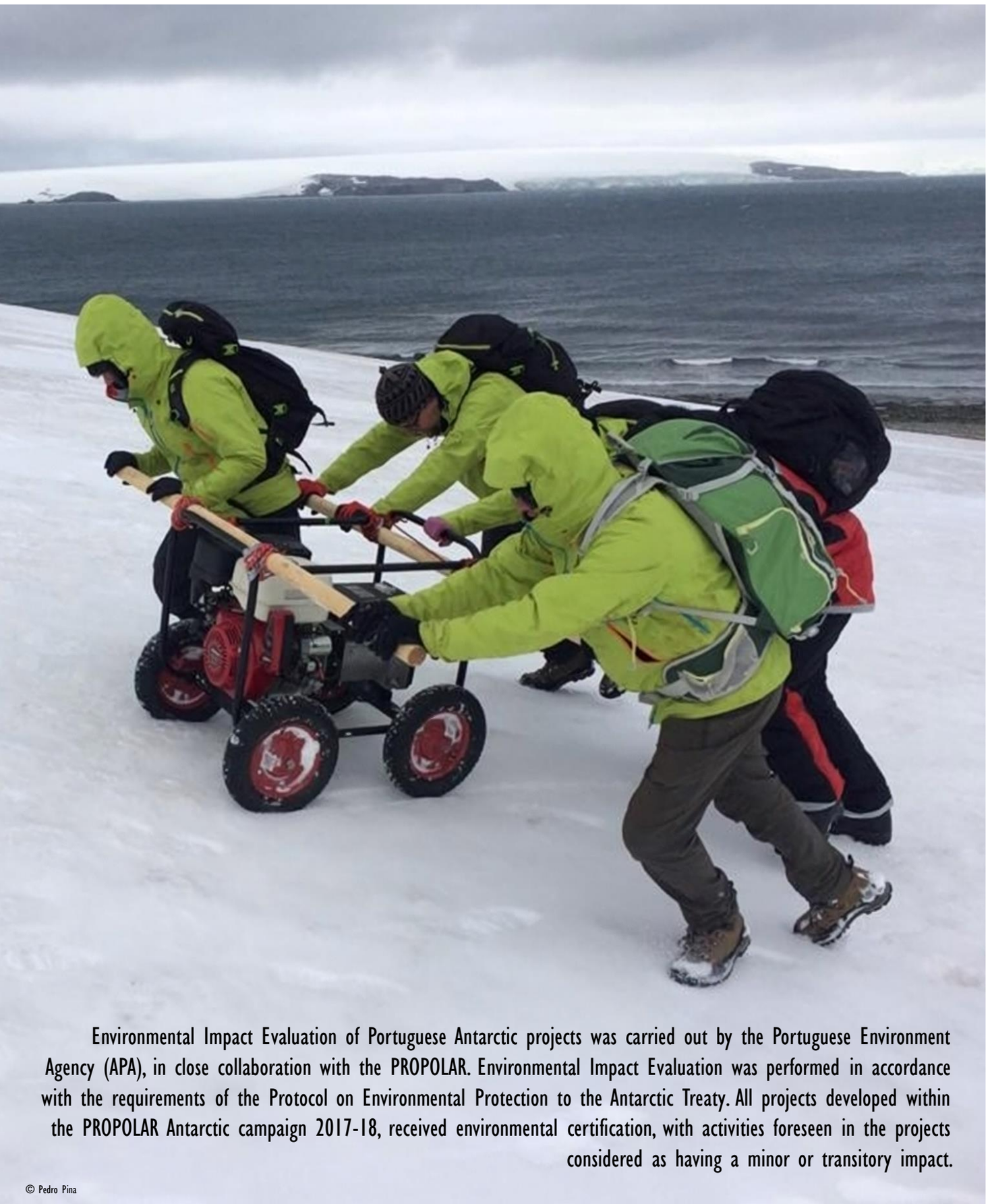
Young researcher: Sara Ramos • 5th European Conference on Permafrost - EUCOP 2018, Chamonix-Mont Blanc. France

POLARUBI 2017-18 - ELEMENTAL AND INDIVIDUAL PARTICLE ANALYSIS OF ATMOSPHERIC AEROSOLS FROM THE ARCTIC REGION

Young researcher: Edgar Conceição • EGU General Assembly 2018, Viena, Austria

CAMPAIGN PREPARATION

ENVIRONMENTAL CERTIFICATION OF ANTARCTIC PROJECTS



Environmental Impact Evaluation of Portuguese Antarctic projects was carried out by the Portuguese Environment Agency (APA), in close collaboration with the PROPOLAR. Environmental Impact Evaluation was performed in accordance with the requirements of the Protocol on Environmental Protection to the Antarctic Treaty. All projects developed within the PROPOLAR Antarctic campaign 2017-18, received environmental certification, with activities foreseen in the projects considered as having a minor or transitory impact.

MEDICAL CERTIFICATION OF ANTARCTIC RESEARCHERS

Medical certification was implemented through the agreement established with the Centro de Medicina Desportiva de Lisboa, from the Instituto Português do Desporto e Juventude (CMDL-IPDJ), in close collaboration with the PROPOLAR. All researchers underwent the required medical exams and clinical evaluations. Medical certification is mandatory for the Portuguese Antarctic scientists and was carried out between November 2017 and January 2018.

© Gonçalo Vieira

Before starting their mission in the polar regions, researchers go through a training program, during the Polar Campaign Preparation Meetings, organized annually by PROPOLAR.

For the PROPOLAR campaign 2017-18, the meeting took place on the 17th of November 2017, gathering polar researchers with projects to be carried out in the Arctic and Antarctica.

© Gonçalo Vieira

In the meeting, researchers received information on fundamental aspects of the Antarctic Treaty and of the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol), since the presence in this region has to respect the rules of these agreements to which Portugal has joined in 2010 and 2014, respectively.

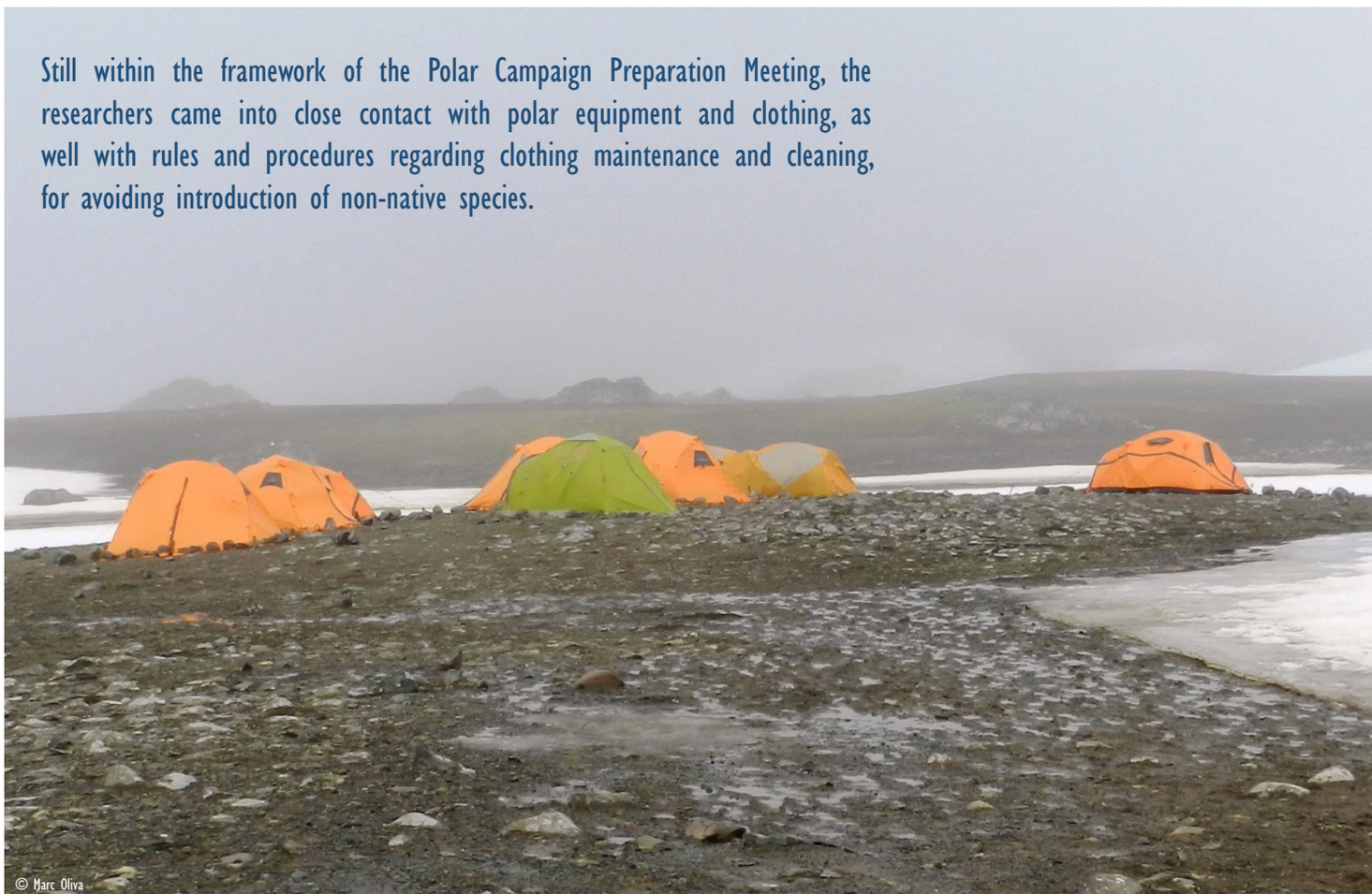
Features and management plans of Antarctic Specially Protected Areas (ASPA) and Antarctic Specially Managed Areas (ASMA) to be visited during the campaign were presented in detail.

© Gonçalo Vieira

Information on codes of conduct and communications, namely VHF radio, was also obtained.

Researchers received materials and information on dissemination of PROPOLAR during the campaign, and on ways to engage in Education & Outreach activities while in mission in the polar regions.

Still within the framework of the Polar Campaign Preparation Meeting, the researchers came into close contact with polar equipment and clothing, as well with rules and procedures regarding clothing maintenance and cleaning, for avoiding introduction of non-native species.



© Marc Oliva

The PROPOLAR provides, on a loan basis, clothes and other equipment to support polar field work. As a rule, two separate sets of clothing are available, one for the Arctic and the other for Antarctica.

© Pedro Guerreiro

© Gonçalo Vieira

POLAR RESEARCHERS TRAINING

Researchers took a 6-hour training course on Basic Life Support (BLS) that included training in cardiopulmonary resuscitation (CPR) and use of automated external defibrillator (AED). The course was provided by an experienced and certified medical and paramedical team, and researchers obtained certification as Course for Basic Life Support (BLS) Providers by the European Resuscitation Council. This practical training prepared researchers for accidents or emergency situations that might occur during their mission on the Polar regions.

LOGISTICS

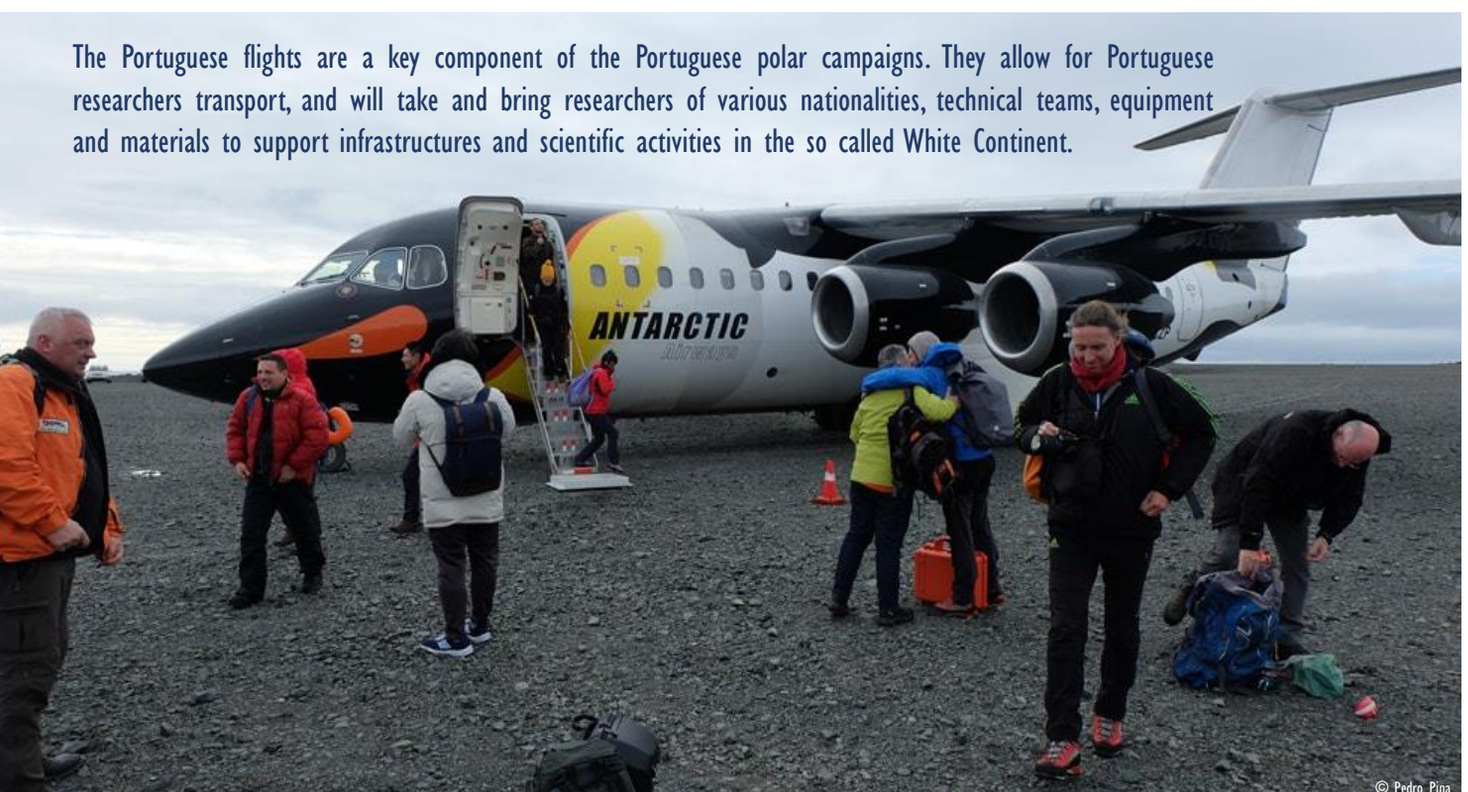
POLAR LOGISTICS

Polar logistics have been one of the main challenges for the development of the Portuguese Polar science, since Portugal has no permanent infrastructures in the Polar regions. International cooperation has been essential to the success of Portuguese polar research and logistics, particularly for the Antarctica. National representation on the Forum of Arctic Research Operators (FARO) and the Council of Managers of National Antarctic Programs (COMNAP) has allowed Portugal to keep up to date with the infrastructures, logistics and technological requirements necessary to support polar research.

The Portuguese contribution to international polar logistics is an annual flight between Punta Arenas (Chile) and the airfield Teniente R. Marsh in King George Island, South Shetlands Islands Archipelago, Antarctica. For this purpose, a BAE 146 airplane is chartered annually to the airline company DAP.

So far, the Portuguese Polar Programme has managed 8 Antarctic flights, supporting the international effort to logistics in Antarctica since 2012.

The Portuguese flights are a key component of the Portuguese polar campaigns. They allow for Portuguese researchers transport, and will take and bring researchers of various nationalities, technical teams, equipment and materials to support infrastructures and scientific activities in the so called White Continent.



© Pedro Pina

During the PROPOLAR campaign 2017-18, the Portuguese flight was carried out on the 31st of January 2018. The inbound and outbound flights carried 57 and 54 passengers, respectively, from Argentina, Belgium, Bulgaria, Chile, China, Germany, Portugal, Republic of South Korea, Spain, Thailand and Turkey. A total of 329 kg of additional cargo was transported. This way, Portugal was able to provide support to its partner polar programs, such as the Bulgarian Antarctic Institute (BAI), the Chinese Arctic and Antarctic Administration (CAA-CHINARE), the Comité Polar Espanhol (CPE), the Korean Polar Research Institute (KOPRI), and the Instituto Antártico Chileno (INACH).


© Pedro Pina

ARCTIC LOGISTICS

Arctic logistics are, in general, more facilitated than that of Antarctica. Although Portugal has no infrastructure in the Arctic region, commercial flights are available for transport of researchers to Arctic countries where they develop their projects. The organisation of the remaining logistics lies with the Arctic research teams, such as transport to working places requiring aircraft or helicopter chartering.

© João Canário

© João Canário

During the PROPOLAR campaign 2017-18, contacts made by Arctic research teams with the South Iceland Research Centre (Iceland University), Norwegian Polar Institute, Centre d'Études Nordiques (CEN, Canada), L'Institut National de la Recherche Scientifique (INRS), University of Laval (Canada), and Arctic Lidar Observatory for Middle Atmosphere Research (ALOMAR, Norway) made the implementation of the work on the ground possible for 6 projects (AMS III, GEOWHIMBREL III, NITROnice, PERMACHEM II, POLARUBI 2017-18; see section THE PROJECTS).

ANTARCTIC LOGISTICS

With no infrastructure on the Antarctic region, Portugal relies on strong international cooperation with the national Antarctic programs from Argentina (Instituto Antártico Argentino, IAA), Brazil (Programa Antártico Brasileiro, PROANTAR), Bulgaria (Bulgarian Antarctic Institute, BAI), Chile (Instituto Antártico Chileno, INACH), China (Chinese Arctic and Antarctic Administration, CAA-CHINARE), Peru (Direção de Asuntos Antárticos), Republic of South Korea (Korean Polar Research Institute, KOPRI), Spain (Comité Polar Espanhol, CPE), Turkey (ITU Polar Research Center, PolReC), United States of America (National Science Foundation, NSF) and Uruguay (Uruguayan Antarctic Institute, UAI), for most Antarctic logistics. Many of these collaborations are sustained by Memorandum of Understanding (MoU). Support is provided for the transport of Portuguese researchers and equipment to and from Antarctica, as well as for stay in Antarctic research stations, camping areas and vessels.

Besides the Portuguese flight, Portuguese scientists were also transported to King George Island on flights open to the international Antarctic community by other national Antarctic programmes. During the PROPOLAR campaign 2017-18, Portuguese researchers have benefited from flights made available by INACH, KOPRI and IAA. Once at King George Island, researchers were accommodated in research stations situated in the island, or transported by partner ships to other islands in the South Shetland Archipelago, for instance, Deception and Livingston Islands, and Cierva Cove, located on the Antarctic Peninsula.

© Pedro Guerreiro

© Pedro Guerreiro

Some research teams travelled all the way from Punta Arenas (Chile) or Ushuaia (Argentina) to Antarctica, on board of research vessels from partner countries, on a voyage of not less than 3 days across the Drake Passage located between South America's Cape Horn and the South Shetland Islands in Antarctica. During the 2017-18 campaign, Portugal has received support from the research vessels BIO Hespérides from the Spanish Navy (managed by Unidad de Tecnología Marina - UTM), BAP Carrasco from the Peruvian Navy, and ROU 26 Vanguardia from the Uruguayan Navy.

ANTARCTIC LOGISTICS

Short-distance transportation, carried out in zodiacs, was ensured by Antarctic programs from Bulgaria, China, Spain and Republic of Korea.

© Pedro Pina

On the scope of the PROPOLAR campaign 2017-18, support was provided for accommodation of researchers in the Korean King Sejong, Peruvian Machu Picchu and the Chilean Professor Julio Escudero stations, located in King George Island, the Argentinian Primavera station at Cierva Cove, and the Bulgarian St. Kliment Ohridski station in Livingston Island.

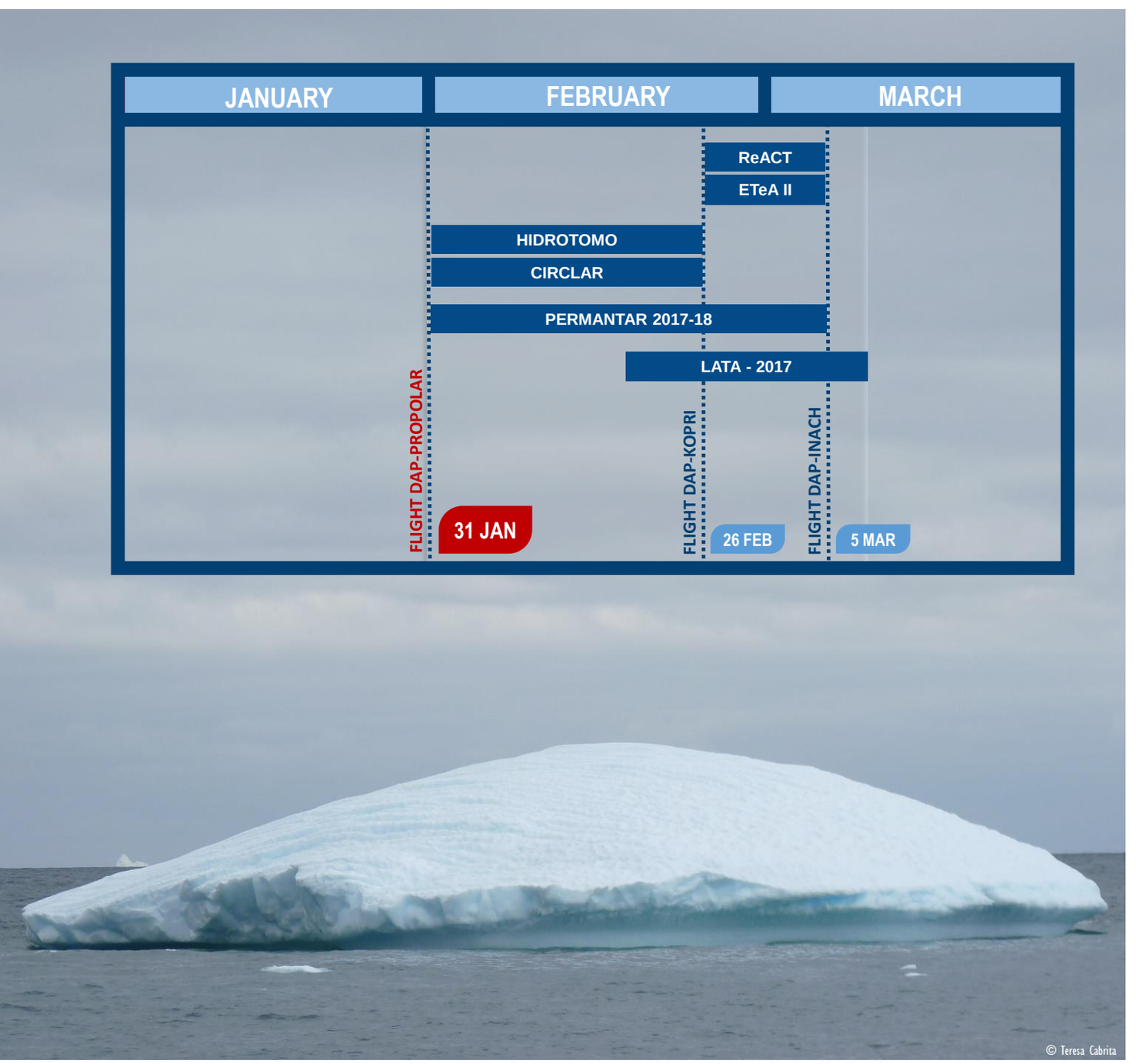
© Pedro Pina

Logistics also involved shipping equipment and materials to Antarctica, to support the scientific activities. This task was carried out with the support of the Comité Polar Español (CPE). The cargo was sent by PROPOLAR to Spain, for boarding on the Spanish vessels BIO Hespérides or Sarmiento de Gamboa, which then sailed to Antarctica. Once there, the cargo was distributed between the locations where the Portuguese teams were working, involving a noteworthy coordination and collaboration effort between CPE, the PROPOLAR logistics team in Portugal and the researchers already in Antarctica.

© Ana David

ANTARCTIC LOGISTICS

The logistical support received by PROPOLAR, allowed the implementation of 6 projects in Antarctica (CIRCLAR, ETeA II, HYDROTOMO, LATA 2017, PERMANTAR 2017-18, ReACT; see section THE PROJECTS). The planning of the campaign was elaborated following the schedules of flights, vessels and research station time availability provided by partner national Antarctic programs.



© Teresa Cabrita

OTHER ACTIVITIES

PORTUGUESE CONFERENCE ON POLAR SCIENCES

The Portuguese Conferences on Polar Science are annual events promoted by PROPOLAR. These conferences aim at promoting national research on Polar regions and are the forum where the most recent advances in Portuguese polar projects are presented. New strategies for national and international cooperation are also outlined. The conferences are targeted to the national polar scientific community, researchers and students focused on understanding the role of the Arctic and Antarctica on the functioning of the Earth system, and particularly on how these regions respond to ever-increasing human pressure. International experts on diverse polar topics are invited for key-note lectures and address relevant questions on which new and emerging perspectives are welcomed. The conferences are hosted by national institutes and research centres integrating polar research teams. During the PROPOLAR 2017-18, the 9th PORTUGUESE POLAR SCIENCES CONFERENCE was hosted by the University of Beira Interior (UBI), at Covilhã (Portugal), on the 6th and 7th of November 2017.

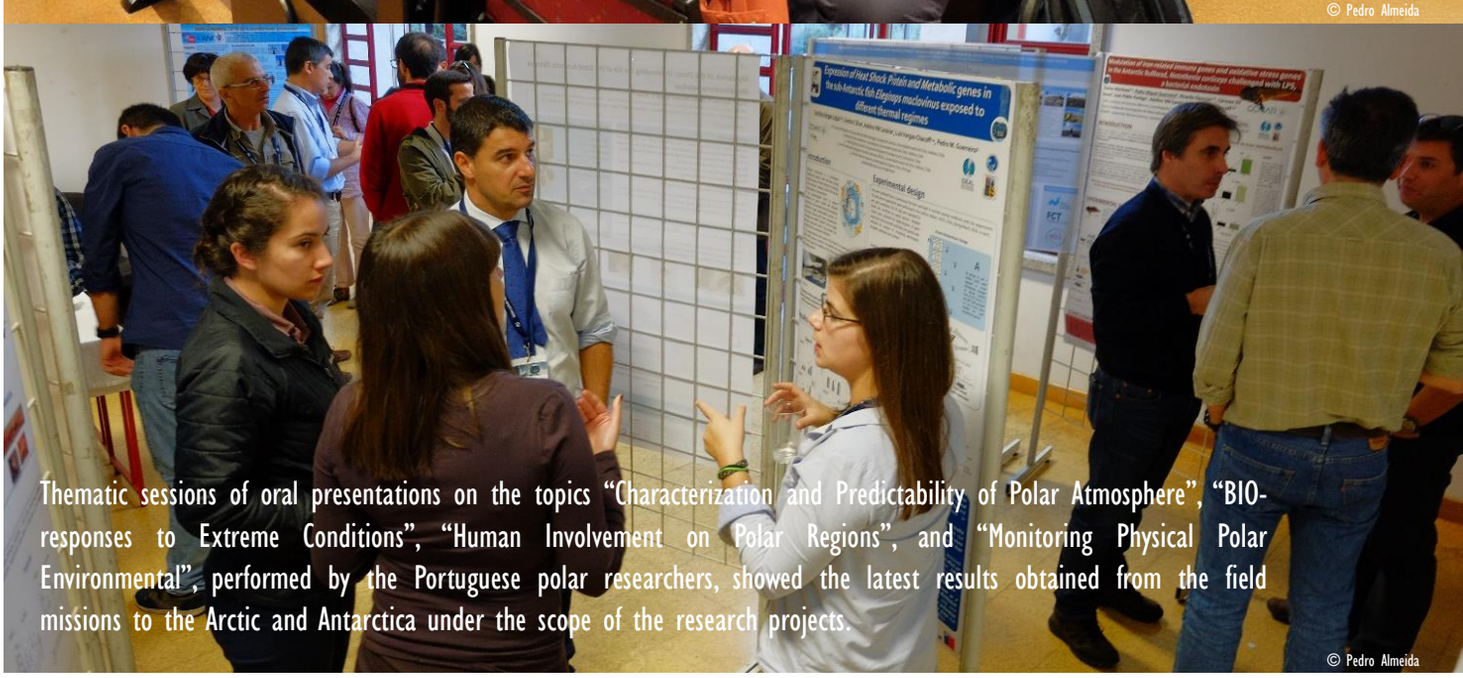
The conference started with an open session on Opportunities and Challenges on/of Polar Research, where personal communications from Teresa Cabrita (PROPOLAR), Germana Santos (Polar Office from the Portuguese Foundation for Science and Technology), José Seco and José Queirós (APECS-Portugal) and Rodolfo Sanchéz, Director of the Instituto Antártico Argentino (IAA) launched the debate on future perspectives regarding investigation of polar regions, and success through partnership in particular between Portugal and Argentina. Rui Fernandes (UBI) and José Xavier (MARE-University of Coimbra) chaired the session to foster audience participation.

© Pedro Almeida

PORTUGUESE CONFERENCE ON POLAR SCIENCES

The conference also hosted the VIII Workshop APECS Portugal, which focused on the fundamental issues underpinning the development of the professional careers of young polar researchers, under the theme Science Pathways. Stephanie Winnard (Royal Society for the Protection of Birds - RSPB), Sara Aparício (European Space Agency - ESA) and Alexander Shestakov (World Wildlife Fund - WWF) participated as invited guests, talking about their own professional choices and pathways.

© Pedro Almeida



Thematic sessions of oral presentations on the topics "Characterization and Predictability of Polar Atmosphere", "BIO-responses to Extreme Conditions", "Human Involvement on Polar Regions", and "Monitoring Physical Polar Environmental", performed by the Portuguese polar researchers, showed the latest results obtained from the field missions to the Arctic and Antarctica under the scope of the research projects.

© Pedro Almeida

COMMEMORATIVE SESSION

"FROM TERRA AUSTRALIS INCOGNITA TO THE PORTUGUESE POLAR PROGRAM"

Ten years after the International Polar Year (IPY), the Portuguese Polar Program organized a commemorative session on the event that marked the start of the national scientific activities in the Antarctica, and put down the roots for a national polar program. A conference entitled "From Terra australis incognita to the Portuguese Polar Program - a tribute to Prof. João Sentieiro 10 years after the International Polar Year" was included in the session and took place at the Caleidoscópio building of the University of Lisbon, on the 13th of March 2018.

© Ana David

The opening session was attended by the President of the FCT, Prof. Paulo Ferrão, the ambassador from Bulgaria in Portugal, Dr. Vassiliy Christov Takev, the Coordinator of the PROPOLAR, Prof. Gonçalo Vieira, the Vice-Rector of the University of Lisboa, Prof. Maria Isabel Rocha, the Director of Centro de Estudos Geográficos of the University of Lisbon, Prof. Mário Vale and the Director of the Bulgarian Antarctic Institute (BAI), Prof. Christo Pimpirev.

The Minister of Science, Technology and Higher Education, Prof. Manuel Heitor, emphasised the support of the Portuguese Government to the development of Portuguese Polar science.


© Ana David

© Ana David

Taking advantage of the event, a Memorandum of Understanding was signed between the FCT and BAI, as Portugal and Bulgaria have been strongly cooperating on science and logistics in Antarctica, since 2006.

The exhibition entitled "Terra Australis: from the geography of the imaginary to reality cartography", prepared by the Cartographic Service of the Bulgarian Army and the Instituto de Geografia e Ordenamento do Território from the Universidade de Lisboa and PROPOLAR, was inaugurated during the event. The exhibition showed the evolution of the cartographic representations of Antarctica, since the beginning of the Modern Age until the present day, including contributions from Bulgaria and Portugal.


© Ana David

COMMEMORATIVE SESSION

"FROM TERRA AUSTRALIS INCOGNITA TO THE PORTUGUESE POLAR PROGRAM"

Several national experts showed the Portuguese polar science developments during the last decade. Representatives from the national media and "Ciência Viva" - National Agency for Scientific and Technological Culture, also intervened to present their experiences and perspectives related to polar science.

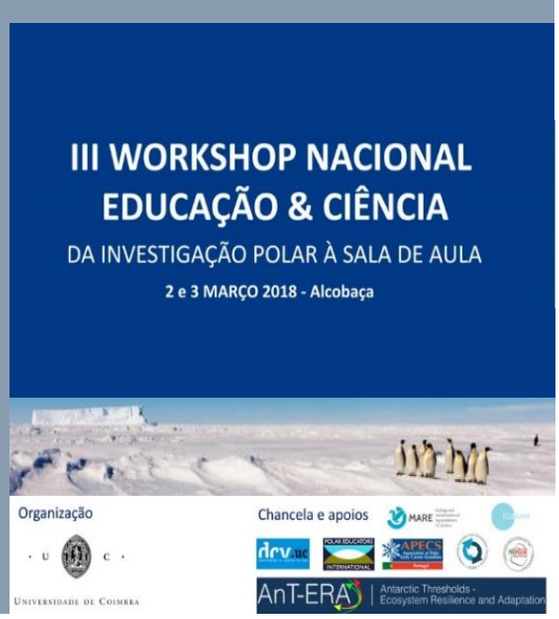
The event ended with an emotional homage from the many polar scientists attending the event, to Prof. João Sentieiro. PROPOLAR and the Portuguese scientists presented a tribute to Prof. João Sentieiro for his dedication to promote Polar sciences in Portugal, especially during his mandate as President of the FCT.

EDUCATION & OUTREACH

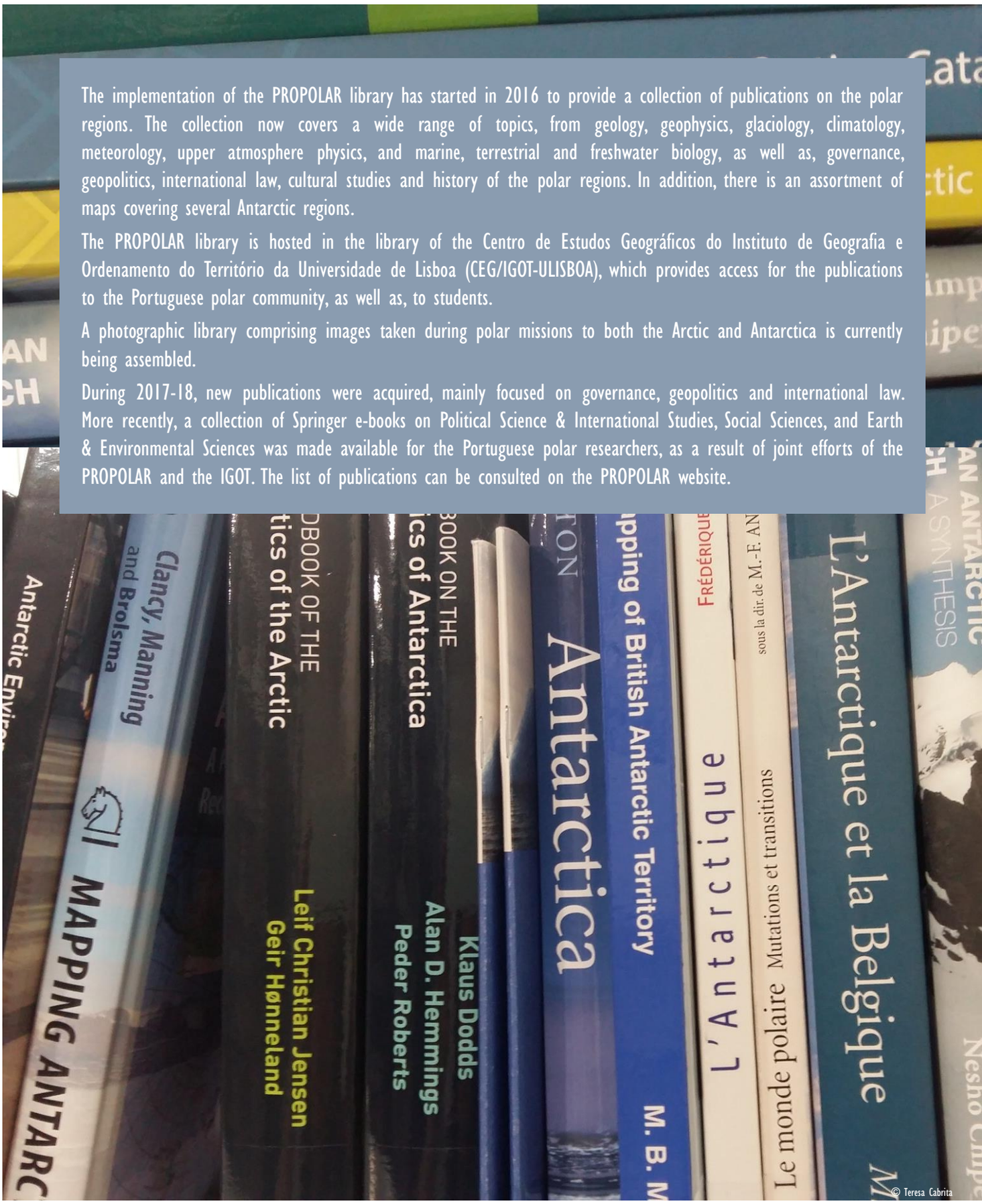
Since the International Polar Year (IPY) 2007-2008, education and outreach has been a strategic priority for the Portuguese Polar Program as a way to inform and motivate society and the young generations towards a behavioural change contributing to a sustainable future. During the IPY 2007-2008, the LATITUDE60!, educational programme, funded by the national agency for scientific and technological culture "Ciência Viva" provided an exceptional opportunity for teachers, students and the general public to have access to relevant and valuable information on polar regions, provided at first hand by Portuguese polar scientists. More than 40 educational activities were organised, involving more than 50 Portuguese nursery, primary and secondary schools and universities. After that, a national program on education and outreach - EDUCAÇÃO PROPOLAR - was implemented in the early stages of the PROPOLAR, set out to engage the young generations in active polar science endeavours on a national scale. The program is implemented jointly by PROPOLAR, APECS Portugal and Polar Educators International (PEI). The Portuguese polar scientific community, young scientists and teachers, have been deeply involved and committed to this initiative, participating in various educational activities, from school talks, to the development of the projects "PROFESSION: POLAR SCIENTISTS" and "POLAR WEEKS". These educational projects offer a wide range of communication tools, for instance, school talks, workshops, presentations, exhibitions, films, games, skype contacts with polar scientists on mission in the Arctic and Antarctica, and practical demonstrations of scientific equipment used for field work in the polar regions. During the PROPOLAR 2017-18, several of these activities were carried out throughout the country. Overall, the Education & Outreach efforts carried out have been very successful, with Portugal being internationally recognized for the excellence of its polar educational and outreach program.

The POLAR WEEKS took place twice during the school year 2017-18, close to spring and fall Equinoxes. Several polar researchers were involved in engaging school talks throughout the country, stimulating students to find out more about polar regions and their relevance and impact to other parts of the world.

The III National Workshop on Education & Science: from polar research to the classroom, took place at Centro de Estudos of the University of Coimbra, in Alcobaça, with collaboration of PROPOLAR and José Xavier, Patrícia Azinhaga, Pedro Pina and Teresa Cabrita. School teachers obtained the latest scientific and educational information on polar regions, and were able to talk through skype to polar scientists Denis Zakharov (Knipovich Polar Research Institute of Marine Fisheries and Oceanography, Russia) directly from Murmansk, and Derren Fox (British Antarctic Survey, UK) from Bird Island, Antarctica. This allowed for networking, and identifying the potential of new teaching tools and future needs of the educational community.



PROPOLAR POLAR LIBRARY



The implementation of the PROPOLAR library has started in 2016 to provide a collection of publications on the polar regions. The collection now covers a wide range of topics, from geology, geophysics, glaciology, climatology, meteorology, upper atmosphere physics, and marine, terrestrial and freshwater biology, as well as, governance, geopolitics, international law, cultural studies and history of the polar regions. In addition, there is an assortment of maps covering several Antarctic regions.

The PROPOLAR library is hosted in the library of the Centro de Estudos Geográficos do Instituto de Geografia e Ordenamento do Território da Universidade de Lisboa (CEG/IGOT-ULISBOA), which provides access for the publications to the Portuguese polar community, as well as, to students.

A photographic library comprising images taken during polar missions to both the Arctic and Antarctica is currently being assembled.

During 2017-18, new publications were acquired, mainly focused on governance, geopolitics and international law. More recently, a collection of Springer e-books on Political Science & International Studies, Social Sciences, and Earth & Environmental Sciences was made available for the Portuguese polar researchers, as a result of joint efforts of the PROPOLAR and the IGOT. The list of publications can be consulted on the PROPOLAR website.

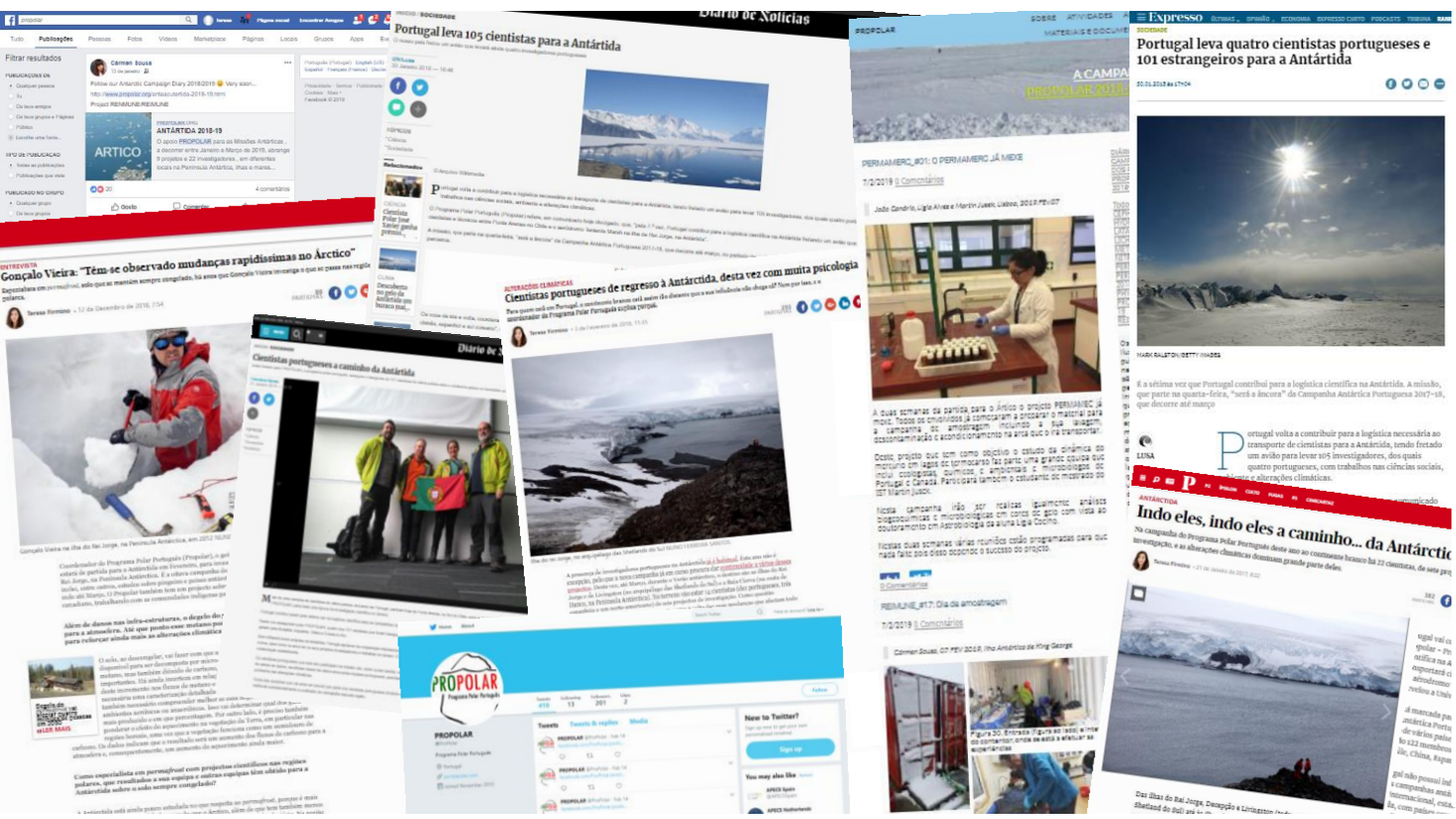
PROMOTING POLAR SCIENCE AND THE IMPORTANCE OF POLAR REGIONS

Raising awareness about the importance of polar regions and disseminating polar science and research, aimed at all types of audiences, are key to the Portuguese Polar Program. In order to disseminate and promote the PROPOLAR polar campaign 2017-18, the Portuguese flight to Antarctica and other important events, PRESS RELEASES were issued through the media, and the Instituto de Geografia e Ordenamento do Território and the University of Lisbon dissemination channels.

Several INTERVIEWS were given to the Portuguese media, generating articles mostly published in online journals, magazines and newspapers. A face-to-face interview given by Gonçalo Vieira, Teresa Cabrita and a Master's student, Pedro Freitas, focused on a decade of Portuguese polar research and on the scientific and logistic features of the polar campaign, was broadcasted on a national weekly radio programme called "The days of the Future". The interview entitled "The 10 years of the Portuguese Polar Program - PROPOLAR", aired on the 10th of March 2018, and can be heard through the link: http://www.rtp.pt/play/p383/e335337/os-dias-do-futuro.

In addition, POLAR MISSION DIARIES were published on the PROPOLAR site, almost on a daily basis, during the duration of the polar missions, enabling the polar research community, people with an interest in the Portuguese polar science, and the public in general, to discover about the missions and scientific adventures of the Portuguese scientists in the Arctic and Antarctica. Amazing photos illustrate the everyday life of the Portuguese scientists during their stay in the polar regions, available on http://www.propolar.org/blog-2017-2018.

The PROPOLAR website (http://www.propolar.org/) provides updated content, and the "PORTAL POLAR" site (https://comitepolarpt.weebly.com/), a TWITTER ACCOUNT (https://twitter.com/propolar?lang=en), FACEBOOK PAGE (https://www.facebook.com/search/str/programa+polar+portugu%C3%AAs/keywords_search?epa=SEARCH_BOX) and a NEWSLETTER, all kept by PROPOLAR, display the activities, events and news related to the Portuguese polar research.



PROPOLAR • REPORT 2018

Portuguese Polar Program - PROPOLAR

Instituto de Geografia e Ordenamento do Território (IGOT)
Centro de Estudos Geográficos (CEG)
Rua Branca Edmée Marques
1600-276 Lisboa, PORTUGAL

Phone: +351 210 442 962
E-mail: info@propolar.org
Website: www.propolar.org

ISBN: 978-972-636-277-7